SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE
DEPARTMENT OF INFORMATION TECHNOLOGY

Elective III

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							Theory		Practical		
							End Sem	Class Work	End Sem	Sessional Work	
IT48601	BIG DATA ANALYTICS	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: Fundamentals knowledge of programming and Java language.

COURSE OBJECTIVES:

1. This course gives an overview of Big Data, i.e. storage, retrieval and processing of big data.

2. It also helps a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.

3. It also focuses on the "technologies", i.e., the tools/algorithms that are available for storage, processing of Big Data.

COURSE OUTCOMES: Students will be able to

CO1 Explain the basic concepts of big data.
CO2 Use different tools and technologies for solve problems of big data.
CO3 Discuss Business Intelligence Concepts, Data Warehousing, Data Mining, and Data Visualization.
CO4 Use the working environment of big data framework and NOSQL database.
CO5 Design and Implement programming for processing and managing big data.
CO6 Solve different Case studies on the current research and applications of the Hadoop and big data in industry.

THEORY:
COURSE CONTENTS:

UNIT 1: Introduction to Big data, Big data characteristics, Types of big data, Traditional versus Big data, Evolution of Big data, challenges with Big Data, Technologies available for Big Data, Infrastructure for Big data, Use of Data Analytics, Desired properties of Big Data system.

UNIT 2: Introduction to Hadoop, Core Hadoop components, Hadoop Eco system, Hive Physical Architecture, Hadoop limitations, RDBMS Versus Hadoop, Hadoop Distributed File system, Processing Data with Hadoop, Managing Resources and Application with Hadoop YARN.

UNIT 3: Introduction to Hive Hive Architecture, Hive Data types, Hive Hive Query Language, Introduction to Pig, Anatomy of Pig, Pig on Hadoop, Use Case for Pig, ETL Processing, Data types in Pig running Pig, Execution model of Pig, Operators, Eval function,Data types of Pig.

UNIT 4: Introduction to NoSQL, NoSQL Business Drivers, NoSQL Data architectural patterns, Variations of NOSQL architectural patterns using NoSQL to Manage Big Data.

UNIT 5: Mining social Network Graphs: Introduction Applications of social Network mining, Social Networks as a Graph, Types of social Networks, Clustering of social Graphs Direct Discovery of communities in a social graph.

TEXT BOOKS RECOMMENDED:

1. Radha Shankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition
2. Seema Acharya, Subhashini Chellappan, " Big Data and Analytics", Wiley, First edition

REFERENCE BOOKS:

1. Kai Hwang, Geoffrey C., Fox. Jack, J. Dongarra, "Distributed and Cloud Computing", Elsevier, First edition
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj, "Big Data Big Analytics", Wiley

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

PRACTICALS:

LAB ASSIGNMENTS:

1. Perform setting up and Installing Hadoop in single Node Cluster.
2. Implement the following file management tasks in Hadoop:
- Adding files and directories
- Retrieving files
- Deleting file

3. A basic Word Count Map Reduce program to understand Map Reduce Paradigm.
4. Implement letter count of word using Map Reduce Paradigm.
5. Implement MapReduce program to find anagrams words.
6.Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
7.Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter   your data.
8. Claim Fraud Use case.

For every healthcare claim, there can be hundreds of associated reports in a variety of different formats. This makes it extremely difficult to verify the accuracy of insurance incentive programs and find the patterns that indicate fraudulent activity. Big data helps healthcare organizations detect potential fraud by flagging certain behaviors for further examination.

Problem Statement.

From a given dataset of medical claim find out the fraudulent claim.

1. By HADOOP
2. By HIVE
3. By PIG
4. By Big data Analytics.

ASSESSMENT TOOLS:
Direct assessment: Lab Assignments, Quiz, Viva-Voce examination (Internal and External), Attendance, Written Test
Indirect assessment: Course End Survey, External Examinar Feedback

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2	1	-	-	-	1	-	-	-	2	1	-
CO2	3	3	3	2	3	-	-	-	2	1	-	1	3	2	1
CO3	3	3	3	2	3	-	-	-	1	1	-	-	2	1	1
CO4	3	3	3	2	3	-	-	-	2	-	-	-	3	2	1
CO5	3	3	3	2	3	-	-	-	2	-	-	-	3	1	1
CO6	3	3	3	3	3	-	-	-	2	1	-	1	2	1	-

SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE
DEPARTMENT OF INFORMATION TECHNOLOGY

Elective III

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48603	Image Processing	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: Python Programming

COURSE OBJECTIVES:
- Fundamental concepts of a digital image processing system.
- Concepts of image enhancement techniques.
- Understanding of various images transforms models.
- Compression techniques and Morphological concepts.
- Various segmentation techniques, and object descriptors.
- Color models and various applications of image processing

COURSE OUTCOMES:

CO1 Remember the fundamental concepts of image processing.
CO2 Capable to explain different image enhancement techniques.
CO3 Understand and review image transforms model.
CO4 Analyze the basic algorithms used for image processing and image compression with morphological image processing.
CO5 Design and Synthesize Color image processing and its real world applications.
CO6 Design and implement real-life problems using Image processing

Course Content

UNIT 1
Introduction to Image processing: Fundamental steps in image processing; Components of image processing system; Pixels; coordinate conventions; Imaging Geometry; Spatial Domain; Frequency Domain; sampling and quantization; Basic relationship between pixels; Applications of Image Processing.

UNIT 2
Image transforms and its properties – Unitary transform; Discrete Fourier Transform; Discrete Cosine Transform; Walsh Transform; Hadamard Transform.

UNIT 3
Image Enhancement in spatial domain Basic Gray Level Transformation functions – Image Negatives; Log Transformations; Power-Law Transformations. Piecewise-Linear Transformation Functions: Contrast Stretching; Gray Level Slicing; Bit Plane Slicing; Histogram Processing– Equalization; Specification. Basics of Spatial Filtering – Smoothing: Smoothing Linear Filters; Ordered Statistic Filters; Sharpening: Laplacian; Unsharp Masking and High Boost Filtering.

UNIT4
Image Enhancement in Frequency Domain Basics of Filtering in Frequency Domain, Filters - Smoothing Frequency Domain Filters : Ideal Low Pass Filter; Gaussian Low Pass Filter; Butterworth Low Pass Filter; Sharpening Frequency Domain Filters: Ideal High Pass Filter; Gaussian High Pass Filter; Butterworth High Pass Filter; Homomorphic Filtering.

UNIT 5
Image Segmentation: Pixel-Based Approach- Multi-Level Thresholding, Local Thresholding, Threshold Detection Method; Region-Based Approach- Region Growing Based Segmentation, Region Splitting, Region Merging, Split and Merge, Edge Detection - Edge Operators; Line Detection, Corner Detection.

Text Books
- Sonka,VaclavHlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning.
- Robert Haralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, AddisonWesley, 1993.

Reference Books
- S Jayaraman, S Esakkirajan and T Veerakumar, Digital Image Procesing, McGraw Hill Education , 2009.
- Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis, and Machine Vision, Thomson Learning, 2008.
- Al Bovik, The Essential Guide to Image Processing, Academic Press, 2009.
- 2. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (English) 3rd Edition
- A K. Jain, Fundamentals of digital image processing, Prentice Hall of India, 1989

List of Experiment:-

- Explain about the various components of image processing system
- Describe about the properties of Discrete Fourier Transform
- Describe in detail about the various polygonal approximation approaches
- Write a program for Walsa Transform.
- Write a program for Hadamard Transform.
- Write a program to demonstrate Image Segmentation.

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	2	-	-	2	-	-	-	-	-	-	-	-	2	-	1
CO3	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	-	3	-	-	-	-	-	-	-	-	-	-	-	1

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Elective III

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48602	Cyber Security & IT Laws	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: Cyber Security, Intellectual Property Rights (IPR).

COURSE OBJECTIVES:

The objective of this course is to emphasize the importance of Cyber Security and IT laws, and to prepare students to conduct a digital investigation in an organized and systematic way.

COURSE OUTCOMES:

CO1   Become aware of various cybercrimes and cyber laws
CO2   Underline the need of digital forensic and role of digital evidences
CO3   Understand different types of digital evidences that can be presented to support investigations
CO4   List the methods to generate legal evidence and supporting investigation reports
CO5   Study of various Indian IT Laws
CO6   Understand the law for Intellectual Property Rights (IPR)

Course Content

UNIT 1
Introduction to cybercrime, definition, cybercrime and information security, classification of
cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian ITA 2000, a global perspective on cybercrime, Cyber offences: How criminals plan them, Tools and methods used in cybercrime, Need of cyber law, The Indian IT act, challenges to Indian law and cybercrime scenario in India, digital signature and Indian IT act, Amendments in the Indian IT act, cybercrime and punishment

UNIT 2
Law and framework for information security, law for intellectual property rights (IPR), patent law, copy right law, Indian copyright act, privacy issue and law in Hong Kong, Japan, and Australia, data protection act in Europe, health insurance portability and accountability act of 1996(HIPAA), Gramm-leach-Bliley act of 1999(GLAB),Sarbanes-Oxley(SOX), legal issue in data mining, building security into software/system development life cycle.

UNIT 3
Digital forensics Science, The need for computer forensics, Understanding computer forensics,computer forensics versus other related disciplines, A brief History of computer Forensics, Cyber forensics and digital evidence, Digital forensics lifecycle, chain of custody concept, Network forensics, Approaching a computer forensics investigation, setting up a

computer forensics laboratory, Forensics and social networking sites, computer forensics from compliance perspective, challenges in computer forensics, forensics auditing, ant forensics.

UNIT4

Current Computer Forensics Tools, Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations

UNIT 5

Forensics of hand held devices, Investigating Network Intrusions and Cyber Crime, Network Forensics and investigating logs, investigating network Traffic, Investigating Web attacks, Router Forensics. Cyber forensics tools and case studies.

Text Books

- Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Fourth Edition, Course Technology.
- Angus M. Marshall, "Digital forensics: Digital evidence in criminal investigation", John – Wiley and Sons, 2008.

Reference Books

- The Indian Cyber law with Cyber glossary, Suresh T. Vishwanathan, New Delhi, Bhart Law House, 2000.
- Law of Cyber Crimes and Information Technology Law, S.V. JogaRao, 2007.
- Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	-	-	-	-	-	2	-	-	2	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	3	-	-	3	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO6	3	-	-	-	-	2	-	-	-	-	-	3	-	2

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Elective III

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							Theory		Practical		
							End Sem	Class Work	End Sem	Sessional Work	
IT48604	WIRELESS NETWORK SYSTEMS	3	-	-	3	-	70	30	-	-	3

PRE-REQUISITES: Communication Engineering, Computer networks

COURSE OBJECTIVES:
1. Study the evolving wireless technologies and standards
2. Learn the architectures of various access technologies such as 3G, 4G, Wi Fi etc.
3. Explain various protocols and services provided by next generation networks.

COURSE OUTCOMES: After completion of course, students will be able to:

CO1 Extend the knowledge of wired computer networks to wireless communication networks.
CO2 Explain the use of wireless communication concepts in the implementation of wireless network systems.
CO3 Differentiate various wireless communication techniques to select the best protocol for a given scenario.
CO4 Examine the performance of various protocol of wireless local area networks.
CO5 Recognize the use of wireless networks in various real life scenario.
CO6 Implement the wireless networks for local area networks and wide area networks.

THEORY:
COURSE CONTENTS:

UNIT 1: Introduction: Overview of Wireless Technologies, Applications, Mobility and Location Based Services, Multiplexing, Cellular System: Cell Concept, Cell Structure, Cell Types, Frequency Management and Channel assignment Strategies, Interference and System Capacity, Co-Channel Interference, Adjacent Channel Interference, Improving Coverage and Capacity in Cellular System, Cell Splitting, Types of Hand-off and their characteristics.

UNIT 2: Motivation : SDMA, FDMA, TDMA, CDMA. Introduction to upcoming and Recent Mobile Communication Technologies: 2G, 2.5G (GPRS), 3G, Introduction to 4G. GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Handover, Security.

UNIT 3: Wireless LAN & MAC Layer: Infrared vs. Radio Transmission, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, MAC Management, Future

Development; Hidden & Exposed Terminals problem, Near and Far Terminal Problem. Introduction to Wi-Fi and Bluetooth Architecture.

UNIT 4: Network & Transport Layer: Impact of mobility on algorithms, Mobile TCP, Mobile IP: Goals, Assumptions & Requirements, Entities & Terminology, IP Packet Delivery, Agent
Advertisement & Discovery, Registration, Tunneling & Encapsulation, Optimizations, ReverseTunneling, IPv6.

UNIT 5: Wireless MAN and PAN: Wireless MANs: Physical and MAC layer details, Wireless PANs: Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TEXT BOOKS RECOMMENDED:
1. J. Schiller, "Mobile Communications", 2nd edition, Pearson Education.
2. A. K. Talukder, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service   Creation", 9th edition,2008, Tata McGraw Hill.
3. C. Siva Ram Murthy and B. S. Manoj, "Adhoc Wireless Networks: Architectures and Protocols", 2nd Edition, Pearson Education, 2008

REFERENCE BOOKS:
1. Vijay K Garg, Kenneth Smolik, Joseph E.Wilkes, "Applications of CDMA in wireless/personal communications", Prentice Hall.
2. W. Stallings, "Wireless Communications and Networks",2nd edition, Pearson Education.
3. Yi. Bing, "Wireless and Mobile Network Architectures", 2nd edition, 2008, Wiley India.
4. Raza B'far "Mobile Computing Principles" Cambridge University press.
5. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	-	-	-	-	-	-	-	-	1	1
CO2	2	2	1	1	-	-	-	-	-	-	-	-	-	1	1
CO3	2	1	1	1	-	-	-	-	-	-	-	-	-	1	1
CO4	3	2	2	2	-	-	-	-	-	-	-	-	-	1	1
CO5	1	2	1	1	-	-	-	-	-	-	-	-	-	1	1
CO6	3	2	2	2	-	-	-	-	-	-	-	-	-	2	2

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Elective III

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48605	Information Retrieval	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: Database Management System, Minimal knowledge of Natural language such as thesaurus, synonyms etc.

COURSE OBJECTIVES:
- Demonstrate genesis and diversity of information retrieval situations for text and hyper media.
- Demonstrate genesis and diversity of information retrieval situations for text and hyper media.
- Demonstrate the usage of different data/file structures in building computational search engines.
- Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia.
- Analyze ranked retrieval of a very large number of documents with hyperlinks between them.
  Demonstrate Information visualization technologies like Cognition and perception in the Internet or Web search engine

COURSE OUTCOMES:

CO1 Describe the objectives of information retrieval systems.
CO2 Describe models like vector-space, probabilistic and language models to iidentify the similarity of query and document.
CO3 Implement clustering algorithms like hierarchical agglomerative clustering and k-means algorithm.
CO4 4 Understand relevance feedback in vector space model and probabilistic model.
CO5 Illustrate how N-grams are used for detection and correction of spelling errors.
CO6 Understand the method of Regression analysis to estimate the probability of relevance.

Course Content

UNIT 1
Introduction: Retrieval strategies: vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language models.
UNIT 2
Retrieval Utilities: Relevance feedback, clustering, N-grams, Regression analysis, Thesauri.
UNIT 3
Retrieval utilities: Semantic networks, parsing Cross –Language: Information Retrieval: Introduction, Crossing the Language barrier
UNIT4
Efficiency: Inverted Index, Query processing, Signature files, Duplicate document detection.
UNIT 5

Integrating structured data and text. A historical progression, Information retrieval as relational application, Semi Structured search using a relational schema. Distributed Information Retrieval: A theoretical Model of Distributed retrieval, web search

Text Books

- David A. Grossman, OphirFrieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition(Distributed by Universal Press), 2004

Reference Books

- Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004.
- SoumenChakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan – Kaufmann Publishers, 2002.
- Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009.

List of Experiment:-

- Implementation of various classification algorithm on text.
- Implementation of various Clustering algorithm on text.
- Implement Domain specific Search Engine.
- Social media analytic.
- Study of Design and development of Question/Answering System.
- Study of IR from Micro blog.

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	3	-	-	-	-	-	2	-	-	2	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	-	-	-	-	-	-	-	-	3	-	-	3	-	2
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO6	3	-	-	-	-	2	-	-	-	-	-	3	-	2	-

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Elective IV

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48702	Management Information System	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: DBMS

COURSE OBJECTIVES:

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions.

COURSE OUTCOMES:

CO1 Relate the basic concepts and technologies used in the field of management information Systems.
CO2 Compare the processes of developing and implementing information systems.
CO3 Outline the role of the ethical, social, and security issues of information systems.
CO4 Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
CO5 Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.
CO6 Understand the MIS functionalities.

Course Content

UNIT 1
Management information system in a digital firm: MIS concept - Definition –Role of the MIS - Impact of the MIS-MIS and the user - Management as a control system - MIS a support to management - Development process of the MIS.

UNIT 2
System analysis and design: System - Need for system analysis - System analysis of the existing system - System analysis of a new requirements - System Development Model - Structured System Analysis and Design - Object Oriented Analysis

UNIT 3
Information system applications: MIS applications, DSS – GDSS - DSS applications in E enterprise - Knowledge Management System and Knowledge Based Expert System - Enterprise Model System and E-Business, E- Commerce, E-communication, Business Process Reengineering.

UNIT4
Technology of information system: Data process- Transaction and application process Information system process; Unified communication and network; Security challenges in E-enterprises; Security threats and vulnerability-Controlling security threat and vulnerability

UNIT 5
Data base management system: Objectives of data base approach- Characters of database Management systems- Data processing system- Components of DBMS packages - Data base administration- Data models - Data warehouse.

Text Books

- Jawadekar, W.S., "Management Information Systems", Tata McGraw Hill Private Limited, New Delhi, 2009.
- Kenneth C. Laudon and Jane P. Laudon: "Management Information Systems" 9/e, Pearson Education, New Delhi.
- Alex Leon and Mathew Leon: "Data Base Management Systems", Vikas Publishing House, New Delhi.
- Goyal, D.P.: "Management Information System", MACMILLAN India Limited, New Delhi, 2008.

Reference Books

- Mahadeo Jaiswal, Monika Mital: "Management Information System", Oxford University Press, New Delhi, 2008.
- Murthy C.S.V.: "Management Information System", Himalaya Publications, New Delhi, 2008.
- Panneerselvam R.: "Database Management System", PHI Private Limited, New Delhi, 2008.
- Philip J, Pratt, Joseph J. Adamski: "Database Management Systems", Cengage Learning, New Delhi, 2009.
- Richard T. Watson: "Data Management ", WILEY INDIA Limited, New Delhi, 2008.
- Rob and Cornell: "Data Base Management Systems" Cengage Learning, New Delhi.

ASSESSMENT TOOLS:
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	1	1	-	-	-	-	-	-	-	2	-	-
CO2	3	1	2	-	-	1	1	-	-	-	-	-	-	3	-
CO3	2	2	1	1	1	-	-	-	-	-	-	-	-	2	-
CO4	-	1	2	-	1	3	1	-	-	-	-	-	3	-	2
CO5	1	2	2	1	-	1	1	-	-	-	-	-	-	3	-
CO6	3	-	-	-	-	2	-	-	-	-	-	3	-	2	-

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Elective IV

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							Theory		Practical		
							End Sem	Class Work	End Sem	Sessional Work	
IT48776	SOFTWARE PROJECT MANAGEMENT	4	-	-	4	-	70	30	-	-	4

PRE-REQUISITES: Fundamentals knowledge of Software Engineering.

COURSE OBJECTIVES: This course is intended to
1. Provide the understanding of Software Project Planning and management techniques.
2. Learn about the activity planning and risk management principles.
3. Develop skills to manage the various phases involved in project management and people management.

COURSE OUTCOMES: After completion of the course, students will be able to:
CO1 Explain the need of Software project management and legal issues.
CO2 Describe Software Project Management aspects related to software development.
CO3 Describe human resource/communication management aspects in SPM
CO4 Define the quality management aspects in SPM
CO5 Describe various estimation techniques and their applications in software project management.
CO6 Discuss risk management, cost management and time management Techniques.

COURSE CONTENTS:

THEORY:

Unit1: Computers and legal issues: intellectual property (copyright, patients and trademarks), computer contracts. Project management: need, responsibilities, project scope.

Unit2: Software development organization and roles, project time management, Project integration management: project plan development, execution and control. Project risk management, project procurement management.

Unit3: Human resource management, project communication management, risk engineering and metrics, managing software life cycle support, continuous process improvement. Project communication management.

Unit4: Software quality management: software quality factors, quality life cycle, quality management systems, capability maturity model, quality control, quality plans, software reviews.

Unit5: Estimation techniques in project management: estimation techniques, size estimations, effort estimates, estimates improvement techniques, function points, algorithmic cost models, project organizational structures.

TEXT BOOKS RECOMMENDED:

1. David Bainbridge, "Introduction to Computer Law", 4thEdition , Pearson Education.
2. Kathy schwalbe Information technology project management –Thomson.
3. Pankaj jalote Software Project Management in Practice 5 thEdition Pearson Education.

REFERENCE BOOKS:

1. Bott F. et al "Professional Issues in Software Engineering 2nd UCL 1995, ISBN: 1-85728-450-X
2. Murali Chemuturi, Thomas M. Cagley, Jr. Ross, "Mastering Software Project Management".

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**,** Quiz**,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	1	-	-	-	-	-	-	3	1	2	1	1
CO2	1	2	2	2	-	-	-	-	-	-	2	1	2	1	1
CO3	-	-	1	1	-	2	-	-	1	2	1	1	1	1	-
CO4	1	1	1	1	-	-	-	-	-	-	1	1	1	1	1
CO5	2	2	2	2	-	-	-	-	-	-	2	1	2	1	2
CO6	-	1	1	-	1	-	-	-	-	-	2	1	2	1	2

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Elective IV

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48703	Simulation Modelling	3	-	2	3	1	70	30	60	40	4

COURSE OUTCOMES:

CO1 Understand the concept of simulation, types of simulation models and discrete event simulation. Develop solutions for application problems using manual simulation and Time Advance algorithm on discrete event simulation.
CO2 Understand the concepts of Statistical models and queuing models
CO3 Apply acceptance rejection technique and inverse transform technique to generate Random Variates and Random numbers using LCM.
CO4 Understand the useful model of input data, absolute performance and estimation with respect to output analysis.
CO5 Understand the model building, verification, calibration, validation of models and optimization.
CO6 Understand the concept of Hypothesis Testing.

Course Content

UNIT 1
Introduction to Software Reliability, Review of Probability, Statistics, Description of Specific Models, Principles used in Modeling, System models and role of simulation. Entities, Attributes, States and Activities, Types of systems - Deterministic, Stochastic, Continuous and Discrete systems, Steps in simulation studies, Advantages and disadvantages of simulation, Areas of Application.

UNIT 2
Random Variables: Discrete Random variable, Probability mass function, Cumulative Distribution function,Continuous Random variable, Probability Density function, Exponential Distribution, Statistical tools and techniques- generation of pseudo random numbers, Random variant generation for uniform, Poisson and normal distributions.

UNIT 3
Stochastic processes: Introduction, Classification of Stochastic processes, Renewal process, independent process, Poisson process, Stationary process,Markov Process: Introduction to Discrete Parameter Markov Chains and Continuous Parameter Markov Chains, Birth-death process. Markov models. Introductory ideas of Simulation of inventory and queuing systems - single and multi-server queues.

UNIT4
Simulation Languages: Continuous system simulation languages, discrete event simulation languages, merits of simulation languages, Exponential Growth and decay models, System dynamics diagrams, Verification and validation of simulation models - input /output validation using a Turing test, Face validity, Sensitivity Analysis.

UNIT 5
Introductory ideas of the following: Sampling, Estimation, Parameter Estimation, Maximum likelihood estimation, Confidence intervals, Hypothesis testing, Performance measures and their estimation: run length of a static and dynamic stochastic simulation.

Text Books
- Narsingh, Deo, "System Simulation with Digital Computers", PHI.
- Gordon, Geoferey, "System Simulation", 2nd Edition, Prentice Hall India.
- Kishore Trivedi, "Probability and Statistics with Reliability, Queuing, and Computer Science Applications", John Wiley and Sons.

Reference Books
- Law, Kelton, "Simulation Modeling and Analysis" Tata Mc-Graw Hill.
- Jerry Banks, "Discrete Event System Simulation", Pearson Education.
- D.S. Hira, "System Simulation", S. Chand & Company Ltd.

Web References
http://www.comp.leeds.ac.uk
http://www.ocw.mit.edu
http://www.eventhelix.com

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments, Quiz, Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	-	-	2	-	-	-	-	-	-	-	-	1	-	-
CO4	2	-	-	2	-	-	-	-	-	-	-	-	1	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO6	2	-	3	-	-	-	-	-	-	-	-	-	1	-	-

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Elective IV

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48704	Information Theory & Coding	3	-	2	3	1	70	30	60	40	4

COURSE OBJECTIVE:
- To define and apply the basic concepts of information theory (entropy, channel capacity etc.)
- To learn the principles and applications of information theory in communication systems
- To study various data compression methods and describe the most common such methods
- To understand the theoretical framework upon which error-control codes are built

COURSE OUTCOMES:

CO1 Quantify the notion of information in a mathematically sound way

CO2 Explain what is the significance of this quantitative measure of information in the communications systems

CO3 Calculate entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system

CO4 Differentiate between lossy and lossless compression techniques

CO5 Decide an efficient data compression scheme for a given information source

CO6 Explain the impact of feedback and/or many senders or receivers on the communication systems

Course Content

UNIT 1

Uncertainty, Information, Measure of information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Relation Ship between entropy and mutual Information, Mutual Information, Noise Free Channel, Channel With Independent Input and Output, Channel Capacity: Noise Free Channel, Symmetric Channel Binary Symmetric Channel, Binary Erasure Channel, Repetition of Signals, Binary Channel, Shannon's Theorems, Continuous channel, Capacity of a Gaussian Channel: Shannon-Hartley Theorem. Bandwidth S/N trade-off.

UNIT 2

Introduction to coding Coding Efficiency Shannon-Fano Coding, Huffman coding, Error Control Coding, Block Codes, Linear Block Codes, Hamming Codes. Groups, Fields and Vector Spaces, Construction of Galois Fields of Prime Order, Syndrome Error Detection, Standard Array and Syndrome Decoding,

UNIT 3

Cyclic Codes, Polynomial Representation of Codewords, Generator Polynomial, Systematic Codes, Generator Matrix, Syndrome Calculation and Error Detection, Decoding of Cyclic Codes, RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes.

UNIT4

Structure and Properties of Convolutional Codes, Convolutional Encoder Representation, Tree, Trellis, and State Diagrams, Distance Properties of Convolutional Codes, Punctured Convolutional Codes and Rate Compatible Schemes

UNIT 5

Decoding of Convolutional Codes, Maximum Likelihood Detection, The Viterbi Algorithm, Automatic Repeat Request Strategies, Basic Techniques, Hybrid ARQ, Introduction to Cryptography, History. Overview of cryptography, Simple classical cryptosystems, Cryptanalysis, Perfect Secrecy, Information theoretic security,One time pad, Secret and Public Key Encryption

Text Books

- R. P. Singh and S. D. Sapre, "Communication Systems", 2nd Edition Tata McGraw-Hill.
- Thomas M. Cover, Joy A. Thomas, "Elements of Information Theory", 2ed Wiley Publication.
- Jorge Castiñeira Moreira, Patrick Guy Farrell , Essentials of Error-Control Coding John Wiley, 2006. ISBN: 978-0-470-02920-6

Reference Books

- William Ryan, Shu Lin, "Channel Codes: Classical and Modern",Cambridge University Press.
- Dominic Welsh, Codes and Cryptography, Oxford Science Publications, 1988
- James F. Kurose, Keith W. Ross ," Computer Networking: A Top Down Approach" 3^{rd}EditionPearson Education.
- Information Theory and Reliable Communication by Robert Gallager

ASSESSMENT TOOLS :
Direct assessment: End-Sem Examination, Mid-Term Test, Class Assignments**, Quiz,** Attendance
Indirect assessment: Course End Survey

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES (H-3, M-2, L-1, or '-'):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	-	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	-	1	-	2	-	-	-	-	-	-	-	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
CO6	2	-	3	-	-	-	-	-	-	-	-	-	1	-	-

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Elective IV

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total Credit
							End Sem	Class Work	Sessional Work	End Sem	
IT-48701	**Machine Learning**	3	-	2	3	1	70	30	60	40	4

PRE-REQUISITES: Fuzzy Logic, Image Processing

COURSE OBJECTIVE:

The aim of Machine Learning course is to prepare students for career in computer science & engineering where knowledge of AI & ML techniques leading to the advancement of research and technology. Machine Learning is the learning in which machine can learn by its own without being explicitly programmed. It is an application of AI that provide system the ability to automatically learn and improve from experience.

COURSE OUTCOMES:

CO1 Apply knowledge of computing and mathematics to machine learning problems, models and algorithms;
CO2 Analyze a problem and identify the computing requirements appropriate for its solution;
CO3 Design, implement, and evaluate an algorithm to meet desired needs; and
CO4 Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.
CO5 Understand the concept of Artificial Neural Network.
CO6 Implement the ANN using feed forward network.

Course Content

UNIT 1
Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets,machine learning models, supervised and unsupervised learning

UNIT 2
Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters

UNIT 3
Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

UNIT4

Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA

UNIT 5
Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

Text Books

- Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer-Verlag New York Inc., 2nd Edition, 2011.
- Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition, 2017.
- Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016

Reference Books

- Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems", Shroff/O'Reilly; First edition (2017).
- Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
- Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Shroff/O'Reilly; First edition (2016).
- Russell, S. and Norvig, N. "Artificial Intelligence: A Modern Approach", Prentice Hall Series in Artificial Intelligence. 2003.

ASSESSMENT TOOLS :
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO5	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO6	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-