

MCA II Semester

Electives for MCA155 (Elective-I)



Knowledge Management

Elective I
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: The goal of this course is to give you a solid foundation covering the major problems, challenges, concepts, and techniques dealing with the organization and management of knowledge with the help of computers. Upon satisfactory completion of this course, you can expect to:

- Understand the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
- Appreciate the role and use of knowledge in organizations and institutions, and the typical obstacles that KM aims to overcome.
- Know the core concepts, methods, techniques, and tools for computer support of knowledge management.
- Understand how to apply and integrate appropriate components and functions of various knowledge management systems.
- Be prepared for further study in knowledge generation, engineering, and transfer, and in the representation, organization, and exchange of knowledge.
- Critically evaluate current trends in knowledge management and their manifestation in business and industry.

Course Contents:

Unit 1: Principles, Case Studies

15 Hrs

- Overview of Knowledge Management
- The Nature of Knowledge
- Knowledge Management Solutions
- Organizational Impacts of Knowledge Management
- Factors Influencing Knowledge Management
- Knowledge Management Assessment of an Organization

Unit 2: Technologies

15 Hrs

- Technologies to Manage Knowledge: Artificial Intelligence, Digital Libraries, Repositories
- Preserving and Applying Human Expertise: Knowledge-Based Systems
- Using Past History Explicitly as Knowledge: Case-Based Systems
- Knowledge Elicitation: Converting Tacit Knowledge to Explicit
- Discovering New Knowledge: Data Mining
- Text KM & Text Mining

Unit 3: Systems

15 Hrs

- Knowledge Discovery: Systems that Create Knowledge
- Knowledge Capture Systems: Systems that Preserve and Formalize Knowledge; Concept Maps, Process Modeling, RSS, Wikis, Delphi Method, etc.
- Knowledge Sharing Systems: Systems that Organize and Distribute Knowledge; Ontology Development Systems, Categorization and Classification Tools, XML-Based Tools, etc.
- Knowledge Application Systems: Systems that Utilize Knowledge

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Reference Books:

- Irma Becerra-Fernandez, Avelino Gonzalez, and G. Sabherwal (2004). *"Knowledge Management Challenges, Solutions, & Technologies"* (Edition with accompanying CD). Prentice Hall. ISBN: 0-13-109931-0.
- Elias M. Awad, Hassan M. Ghaziri (2004). *"Knowledge Management"*. Prentice Hall. ISBN: 0-13-034820-1.
- Ian Watson (2002). *"Applying Knowledge Management: Techniques for Building Corporate Memories"*. Morgan Kaufmann. ISBN: 1558607609.
- Madanmohan Rao (2004). *"Knowledge Management Tools & Techniques: Practitioners & Experts Evaluate KM Solutions"*. Butterworth-Heinemann. ISBN: 0750678186.
- Amrit Tiwana (2002). *"The Knowledge Management Toolkit: Orchestrating IT, Strategy, & Knowledge Platforms"* (2nd Edition). Prentice Hall. ISBN: 013009224X.
- Stuart Barnes (Ed) (2002). *"Knowledge Management Systems: Theory & Practice"*. Thomson Learning.
- Stuart Russell, Peter Norvig (2003). *"Artificial Intelligence: A Modern Approach"* (2nd Edition). ISBN: 0-13-790395-2.
- Ian H. Witten, Alistair Moffat, Timothy C. Bell (1994). *"Managing Gigabytes"*. Van Nostrand Reinhold. ISBN: 0-442-01863-0.
- Christopher D. Manning, Hinrich Schuetze (1999). *"Foundations of Statistical Natural Language Processing"*. MIT Press. ISBN: 0262133601.
- Robert Dale, Hermann Moisl, Harold Somers (Eds) (2000). *"Handbook of Natural Language Processing"*. Marcel Dekker. ISBN: 0824790006.
- Dan Sullivan (2001). *"Document Warehousing & Text Mining"*. Wiley. ISBN: 0-471-39959-0.
- David M. Levy (2001). *"Scrolling Forward: Making Sense of Documents in the Digital Age"*. Arcade Publishing. ISBN: 1559705531.
- Chris Collison, Geoff Parcell (2001). *Learning to Fly: Practical Lessons from one of the World's Leading Knowledge Companies"*. Capstone. ISBN: 1-84112-124-X.
- Peter F. Drucker, David Garvin, Leonard Dorothy, Straus Susan, John Seely Brown (1998). *"Harvard Business Review on Knowledge Management"*. Harvard Business School Press. ISBN: 0875848818.
- Thomas H. Davenport, Laurence Prusak (2000). *"Working Knowledge"*. Harvard Business School Press. ISBN: 1578513014.

Management Information System



Elective I
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: The course aims at enabling students understand the concepts of various types of information system and the application of these systems in managing the business houses more efficiently.

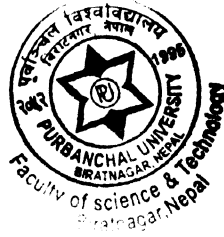
Course Contents:

- 1 Managing the Digital Firm (6 Hrs)**
 - 1.1 Data, Information: Function, cost and values, Difference between data and Information
 - 1.2 Information system and its components
 - 1.3 Level and Types of Information system
 - 1.4 Contemporary approaches to Information System
 - 1.5 Towards the Digital Firm: The new role of Information System in Organization
 - 1.6 Learning to use Information System: New opportunities"
 - 1.7 Trends in Information Technology and Impacts of IT
- 2 Information Systems in the Enterprise (4 Hrs)**
 - 2.1 Key system applications in Organization
 - 2.2 System from a functional perspective
 - 2.3 Integrating functional and Business processes: Enterprise Systems and Industrial Networks
- 3 Information Systems, Organizations, Management, and Strategy (4 Hrs)**
 - 3.1 Organizations and Information Systems
 - 3.2 The changing role of Information Systems in Organization
 - 3.3 Managers, Decision Making and Information Systems
 - 3.4 Information System and Business Strategy
- 4 The Digital Firm: Electronic Commerce and Electronic Business (5 Hrs)**
 - 4.1 Electronic Commerce : Introduction, Benefits to Organization, Consumers, and society
 - 4.2 Types of E-Commerce : B2B, B2C, C2C, G2B, G2C
 - 4.3 Electronic Business and the digital firm
 - 4.4 Management Challenges and opportunities
 - 4.5 Brief introduction to E-payment System
- 5 Managing Information Technology. (6 Hrs)**
 - 5.1 Managing Hardware Assets
 - 5.2 Managing Software Assets
 - 5.3 Managing Telecommunication and Networks
 - 5.4 Managing Database Systems
 - 5.5 Internet Technology, Intranet, Extranet and Business Environment
- 6 Enhancing Management Decision-making for the Digital Firm (6 Hrs)**
 - 6.1 Decision Support System: Introduction, Models and Components
 - 6.2 Group Decision Support System
 - 6.3 Executive Support in the Enterprise
 - 6.4 Decision and Expert system
- 7 Redesigning the Organization with Information Systems (6 Hrs)**
 - 7.1 Systems as planned organizational change
 - 7.2 Business Process Reengineering and total quality management
 - 7.3 Overview of Systems Development
 - 7.4 Alternative systems building approaches
- 8 Understanding the Business Value of Systems and Managing Change (4 Hrs)**
 - 8.1 Understanding the business value of information system
 - 8.2 The importance of change management in information system success and failure
 - 8.3 Managing Implementation
- 9 Information Systems Security and Control (4 Hrs)**
 - 9.1 System Vulnerability and Abuse
 - 9.2 Creating a control environment
 - 9.3 Ensuring System Quality
 - 9.4 Ethical Issues
 - 9.5 Cyber laws

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Reference Books:

1. Kenneth Laudon & Jane Laudon, "Management Information Systems", Tata McGraw-Hill, New Delhi
2. Uma G. Gupta, "Management Information Systems: A Managerial Perspective", Galgotia Publication Pvt. Ltd., New Delhi
3. James A. O'Brien, "Management Information Systems: Managing Information Technology in E-Business Enterprise", Tata McGraw-Hill Publishing Co. Ltd., New Delhi
4. W. S. Jawadaker, "Management Information Systems", Tata McGraw-Hill
5. A. K. Gupta, "Management Information Systems", S. Chand & Co. Ltd., New Delhi



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Geographic Information System



Elective I
Credit Hr: 3

Full Marks: 100
Internal: 40
Final Exam: 60

Course Objective: This course would provide students with the theoretical and practical principles for handling spatial data in geographical information systems.

Course Contents:

Unit 1: Introduction to Geographical Information Systems

[4 Hrs]

Historical Development of GIS, Basic Concepts of GIS and its Components, Socio-economic Challenges, Benefits of using GIS, Application of GIS and its Scope.

Unit 2: Spatial Representation of Geographic Data

[8 Hrs]

The Real World and Geographic Phenomena, Spatial Data Models, Vector Modeling and Raster Modeling, Tessellations and Quad-tree Representation, Modeling Surfaces and Networks, Digital Terrain Model, Databases and Database Management Systems in GIS.

Unit 3: Sources, Collection and Integration of Data

[8 Hrs]

Introduction, Digitizing Maps, Surveying and Manual Coordinate Entry, Aerial Photographs and Photo Interpretation, Vectorization, Global Positioning System, Remote Sensing Systems, Data Editing and Verification.

Unit 4: Georeferencing and Mapping Systems

[7 Hrs]

Spatial Referencing, Maps and Map Coordinates, Scaling and Mapping process, Map Projection, Types and Aspects of Map Projections, UTM.

Unit 5: Spatial Analysis

[8 Hrs]

Introduction, Measurements, Queries, Reclassification, Buffering and Neighborhood Functions, Map Overlay, Network Analysis and Applications.

Unit 6: Data Quality and Data Standards

[6 Hrs]

Sources of Errors in GIS, Concepts related to Data Quality, Components of Data Quality, Geographic Data Standards, Metadata and Clearinghouse.

Unit 7: Building and Implementing GIS

[4 Hrs]

Planning, Building and Implementing GIS, GIS Diffusion and Management Issues, Future of GIS.

Laboratory: There shall be following lab exercises.

1. Exploring a sample of GIS concept through ArcGIS/ArcView
2. Overlay operations
3. Querying the database
4. Reclassification
5. Working with spatial data and tables
6. Measurement of geographics features

Reference Books:

1. C. P. Lo & Albert K. W. Yeung, "Concepts & Techniques of Geographic Information Systems", PHI Pvt. Ltd., New Delhi
2. Peter A. Burrough & Rachael A. McDonnell, "Principles of Geographical Information Systems", Oxford University Press
3. Ian Heywood, Sarah Cornelius, Steve Carver, & Srinivasa Raju, "An Introduction to Geographical Information Systems", Pearson Education

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Network Management & Administration



Elective I
Credit Hr: 3

Full Marks: 100
Internal: 40
Final Exam: 60

Course Objective: To provide comprehensive information on SNMP-based network and internetwork management.

Course Contents:

- 1. Introduction to Computer Networks** [6 Hrs]
Uses of Computer networks, Network Types and Topologies, Network Reference Models – OSI and TCP/IP, Internetworking.
- 2. Medium Access Sublayer** [7 Hrs]
CSMA/CD, IEEE 802.3 and Ethernet, IEEE 802.4 – Token Bus, IEEE 802.5 – Token Ring, IEEE 802.6 – DQDB, FDDI.
- 3. Network Layer Issues** [8 Hrs]
IP Protocol, IP Addresses, CIDR – Classless InterDomain Routing, Internet Control Protocols – ICMP, ARP, RARP, Routing Basics, Distance Vector Routing, Link State Routing, Congestion Control.
- 4. Application Layer Issues** [6 Hrs]
DNS – Domain Name System, The World Wide Web, Electronic mail, Network Security.
- 5. Network Management Issues** [4 Hrs]
Network Management Requirements, Network Management Systems.
- 6. SNMP – Simple Network Management Protocol** [8 Hrs]
The SNMP Model, ASN.1 – Abstract Syntax Notation 1, SMI – Structure of Management Information, The MIB – Management Information Base, The SNMP Protocol.
- 7. RMON – Remote Network Monitoring** [6 Hrs]
Basic Concepts, Statistics Collection, Alarms and filters, RMON2.

Reference Books:

1. William Stallings, "SNMP, SNMP2 V2 & RMON", Addison Wesley, 1996
2. Andrew S. Tanenbaum, "Computer Networks", 4th Edition, Prentice Hall
3. Marshall T. Rose, "An Introduction to Network Management", Prentice Hall

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Data Mining & Data Warehousing

Elective I
Credit Hr: 3



Full Marks: 100
Internal: 20
Exam: 80

Course Contents:

1. Introduction

Background
What is Data Mining?
Data Mining - On what kind of Data?
Data mining functionalities.
Are all of the patterns interesting?

(3 Hrs)

2. Data Warehouse and OLAP Technology for Data Mining

Data warehouse, Multidimensional data model, Data warehouse Architecture and Implementation, Data Cube Technology, From Data Warehouse to Data Mining

(3 Hrs)

3. Data Preprocessing

Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation

(3 Hrs)

4. Data Mining Primitives, Languages and System Architectures

What defines Data Mining Task? Data Mining Query Language, Architecture of Data Mining Systems.

(3 Hrs)

5. Mining Association Rules in Large Databases

Association Rule Mining, Mining single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transactional Databases, Mining Multilevel Association Rules from Relational Databases and Data Warehouse, From Association Mining to Correlation Analysis. Constraint Based Mining.

(3 Hrs)

6. Classification and Prediction

Introduction to Classification and Prediction, Decision Trees, Bayesian Classification, Classification by Backpropagation, Classification based on Concept from Association Rule Mining, Other Classification methods, Prediction, Classifier Accuracy.

(12 Hrs)

7. Cluster Analysis

Introduction – Cluster Analysis, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid Based Methods, Model Based Clustering methods, outlier Analysis.

(3 Hrs)

8. Mining Complex Types of Data

Multidimensional Analysis and Descriptive Mining of Complex Data objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Database, Mining the World Wide Web.

(9 Hrs)

9. Application and Trends in Data Mining

Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Social Impacts of Data Mining, Trends on Data Mining.

(6 Hrs)

Reference Books:

- "Data Mining: Concepts & Techniques", Jiawei Han, Micheline Kamber, Elsevier
- "Data Mining", Pieter Adrianns, Dolf Zantinge, Addison Wesley
- "Data Warehousing in the Real World", Sam Anahory, Dennish Murray, Pearson Education
- "The Data Warehouse ToolKit", Kimball R., Wiley

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Software Testing



Elective I
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Contents:

- 1. Fundamentals of Testing** (6 Hrs)
 - Why is testing necessary?
 - Causes of software defects
 - Testing and quality
 - How much testing is enough?
 - General testing principles
 - Fundamental test process
 - Test planning and control
 - Test analysis and design
 - Test implementation and execution
 - Evaluating exit criteria and reporting
 - Test closure activities

- 2. Testing throughout the Software Life Cycle** (8 Hrs)
 - Software development model – V Model
 - Verification and Validation
 - Test levels
 - Unit testing
 - Integration testing
 - System testing
 - Acceptance testing – Alpha Testing, Beta Testing
 - Test types
 - Functional testing
 - Non-functional testing
 - Confirmation testing (Re-testing)
 - Regression testing

- 3. Static Techniques** (4 Hrs)
 - Static techniques and the test process
 - Review process
 - Phases of a formal review
 - Roles and responsibilities
 - Types of review – Peer Review, Walkthrough, Inspection
 - Success factors for reviews

- 4. Test Design Techniques** (8 Hrs)
 - The Test Development Process
 - Specification-based or black-box techniques
 - Equivalence partitioning
 - Boundary value analysis
 - Decision table testing
 - State transition testing
 - Structure-based or white-box techniques
 - Statement coverage
 - Decision (Branch) coverage
 - Experience-based techniques

- 5. Types of System Testing** (5 hrs)
 - Performance Testing, Load Testing, Stress Testing
 - Security Testing, Usability Testing
 - Smoke Testing, Compatibility Testing
 - Recovery testing, Backup testing

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6. Test Management

(8 Hrs)

- Test organization
 - Test organization and independence
 - Tasks of the test leader and tester
- Test planning and estimation – Test Plan IEEE 829
- Test Cases
 - Structure of Test Cases
 - Test Case Template
 - Exit criteria
- Test Reports
- Configuration management

7. Defect Tracking and Defect Reporting

(3 Hrs)

- Bug Life Cycle Stages
- Priority, Severity
- Defect Prevention Meetings, Defect Parato charts

8. Tool Support for Testing

(3 Hrs)

- Tool support for static testing
- Tool support for test specification
- Tool support for test execution and logging
- Tool support for performance and monitoring

Reference Books:

1. "Software Engineering", R. Pressmen, 6th Ed.
2. "Software Engineering", Sommerville
3. "Introducing Software Testing", Louise Tamres
4. "Effective Methods for Software Testing", William Perry, John Wiley & Sons
5. "Software Testing in Real World", Edward Kit
6. "Software Testing Techniques", Boris Beizer
7. "Software Quality Assurance: Principles & Practices", Nina Godbole, Narosa Publishing

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