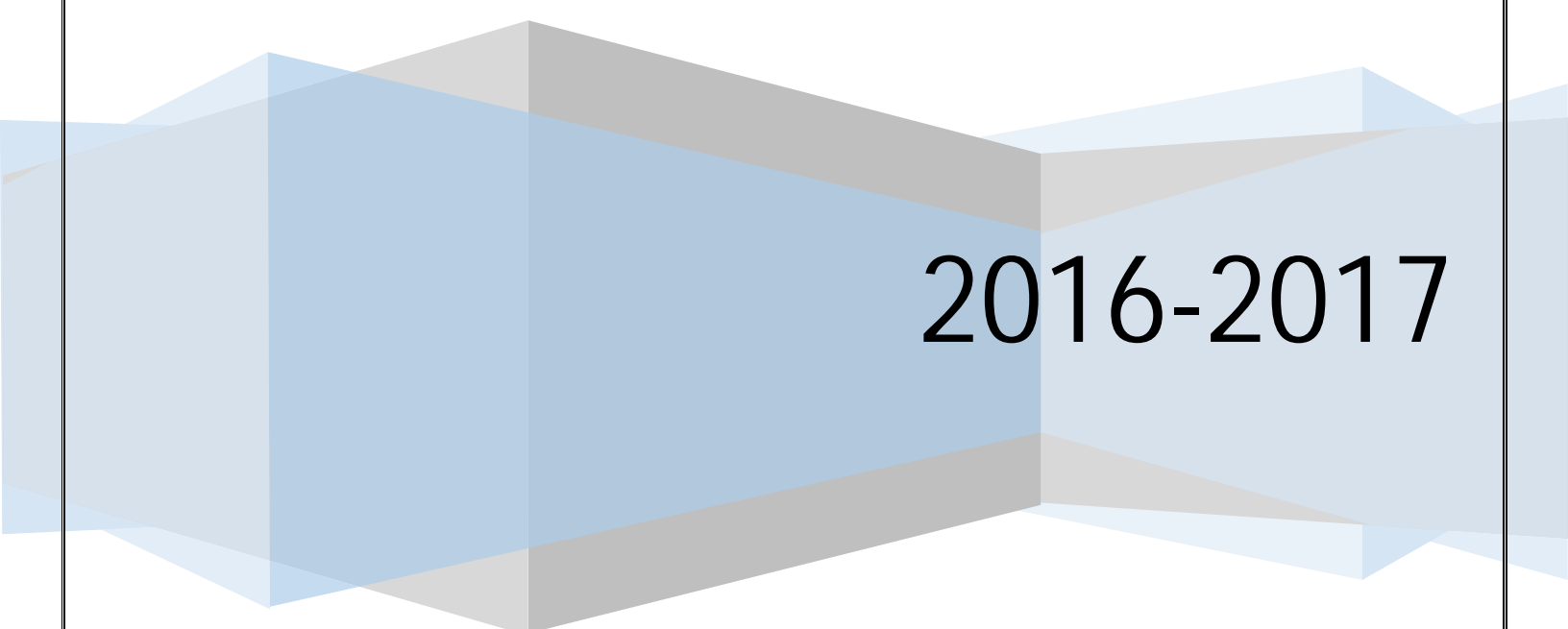# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME OF INSTRUCTION AND SYLLABI of B. Tech. Program

RGUKT, Basar

2016-2017

IV YEAR
I SEMESTER

Subject Code	Course Name	L-T-P	Credits
CS3900	Internship		6
CS4101	Artificial Intelligence	4-0-0	4
CS4102	Data Mining	4-0-0	4
CS4103	Computer Networks	4-0-0	4
BSBE2001/3001	Environmental Science	4-0-0	3
CS4701	Data Mining Lab	0-0-3	2
CS4700	Project	0-0-3	4
Total		16-0-6	27

L-Lectures, T-Tutorials, P-Practicals, C-Credits

CS4101   **ARTIFICIAL INTELLIGENCE**

Externals: 60Marks   **L-T-P-C**
Internals: 40Marks   **4-0-0-4**

Objectives

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, expert systems, machine learning and natural language processing

UNIT – I
Introduction : AI problems, foundation of AI and history of AI; Intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, state space, problem formulation,
Search Techniques: Uninformed search straregies: BFS, DFS, Iterative deepening DFS, Biderectional search.

UNIT – II
Informed search: Greedy best first search, A* search. Heuristic Functions,
Local search Algorithms and Optimization problem: Hill climbing search, Local beam search. **Game playing:** Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search. Solution of constraint satisfaction problems using search.

UNIT – III
Knowledge Representation & Reasoning: logical Agents, Knowledge Based Agents, First Order Logic, propositional logic, Inference in First-order Logic, Resolution, Forward & Backward Chaining, frames.

UNIT -IV:
Planning: state-space, plan space and partial order planning, plannnig graphs, planning algorithms;

Uncertainty Treatment: Formal and empirical approaches including Bayesian theory, belief functions, certainty factors, and fuzzy sets.

UNIT -V:

Learning: Inductive learning, decision tree learning. Statistical Learning Methods: Statistical Learning, Learning with complete data, learning with Hidden variable, Instance based learning, Using neural network.

Case Study: Handwritten Digit Recognition, Natural Language Processing.

Suggested References::
1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/
2. Pearson Education.
3. Rich, E. and Knight, K., "Artificial Intelligence", Tata McGraw-Hill, 2006.
4. Nilsson, N. J., "Artificial Intelligence: A New Synthesis", Morgan Kaufmann, 1998
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CS4102   **DATA MINING**

Externals: 60Marks   **L-T-P-C**
Internals: 40Marks   **4-0-0-4**

Objectives:
- To impart an introduction to Data Mining.
- To develop basic knowledge of how data is transformed to Data Warehouses.

UNIT – I:
Introduction to Data Mining: What is data mining? Related technologies - Machine Learning, DBMS, OLAP and Statistics**.** Data Mining Goals, Stages of the Data Mining Process **,** Data Mining Techniques. Knowledge Representation Methods, Applications. Example: weather data

Data Warehouse and OLAP: Data Warehouse and DBMS, Multidimensional data model **,** OLAP operations, Example: loan data set.

UNIT – II:
Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies**.** Installing Weka 3 Data Mining System. Experiments with Weka - filters, discretization.

Data mining knowledge representation : Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka – visualization.

Attribute-oriented analysis: Attribute generalization**,** Attribute relevance, Class comparison, Statistical measures, Experiments with Weka - using filters and statistics

UNIT – III:
Data mining algorithms: Association rules - Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis. Experiments with Weka - mining association rules.

Data mining algorithms: Classification - Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, Experiments with Weka - decision trees, rules

UNIT – IV:
Data mining algorithms: Prediction - The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka-Prediction
Evaluating what's been learned: Basic issues, Training and testing, Estimating classifier accuracy (holdout, cross-validation, leave-one-out), Combining multiple models (bagging,

boosting, stacking), Minimum Description Length Principle (MLD), Experiments with Weka - training and testing

UNIT – V:
Clustering: Basic issues in clustering, First conceptual clustering system: Cluster/2 , Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb

Advanced techniques, Data Mining software and applications: Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). Bayesian approach to classifying text
Web mining: classifying web pages, extracting knowledge from the web. Data Mining software and applications

Suggested References:
1. I. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.
2. J. Han and M. Kamber. Data Mining: Concepts and Techniques, 2nd Ed. Morgan Kaufman. 2006.
3. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.
4. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001.
5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining. Addison-Wesley Longman Publishing Co.

CS4103   **COMPUTER NETWORKS**

Externals: 60Marks   **L-T-P-C**
Internals: 40Marks   **4-0-0-4**

Objectives:
- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To introduce UDP and TCP Models.

UNIT - I:
Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparioson of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer: design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.

UNIT - II:
Multi Access Protocols: ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT-III:
Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing alhorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

UNIT-IV:
Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, IMCP, ARP, RARP, DHCP.
Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

UNIT-V:
The Internet Transport Protocols: UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection

Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

Application Layer: Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

Suggested References:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
3. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Edication.
4. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
5. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
6. Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.
7. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

BSBE2001/3001   ENVIRONMENTAL SCIENCE

Externals: 60Marks   **L-T-P-C**
Internals: 40Marks   **4-0-0-3**

Objectives:

Learning Objectives:
The syllabus aims to:
- Stimulate interest in the environment and endeavors to generate awareness about environmental concerns among students.
- Develop an understanding of how natural resources and the environment affect quality of life and the quest for sustainable development.
- Develop knowledge and understanding of environmental issues and principle and apply their knowledge to mitigate the environmental problems.
- Understand and resolve some of today's most challenging scientific and policy issues—including global climate change, pollution, biodiversity conservation, sustainability, environmental pollution and toxic waste disposal, disease control, disaster management, socio-environmental issues and balancing resource use and preservation.
- Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.
- Recognizes the global changes and responses for attaining a more sustainable environment.

UNIT 1: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES
Definition, scope and importance, need for public awareness.

UNIT 2: NATURAL RESOURCES:
Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- .Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT 3: ECOSYSTEMS & BIODIVERSITY

Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystems:-
a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

b. Biodiversity- Definition : genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

c. Biodiversity at global, National and local levels. Inida as a mega-diversity nation Hot-sports of biodiversity.

d. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT 4: ENVIRONMENTAL POLLUTION

Definition, Cause, effects and control measures of :- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards
- Solid waste Management: Causes, effect s and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Environment Protection Act., Air (Prevention and Control of Pollution) Act. Water Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act .

UNIT 5 : SOCIAL ISSUES & THE ENVIRONMENT

Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.
Field work: Visit to a local area to document t environmental assets river/ forest/grassland/hill/mountain Visit to a local polluted site-Urban/Rural/Industrial/Agricultural . Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

REFERENCES :

a). Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

b). Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad- 380 013, India, Email:mapin@icenet.net (R)

c). Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

d) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

e). Cunningham, W.P. Cooper, T.H. Gorhan i, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 116p .

CS4701   **DATA MINING LAB**

Externals: 60Marks   **L-T-P-C**
Internals: 40Marks   **0-0-3-2**
Objectives:
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

Experiments:

1. Dimension reduction techniques to handle multi-dimensional data
2. Practical Machine Learning Tools and Techniques
3. Dimension reduction techniques to handle multi-dimensional data
4. Scalable algorithms for classification and clustering
5. Bayesian Networks

For the detailed list of programs refer the lab manual.

Note: Any experiment according to the syllabus of CS3203 can be substituted

CS4700   **PROJECT**

External panel: 60 Marks   **L-T-P-C**
Internal advisor: 40 Marks   **0-0-3-4**

Student has to do literature review on the chosen/allotted area of project work and must submit a report.