Artificial Intelligence

BEG471CO

Year IV   Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical*	Theory**	Practical	
3	1	3/2	20	25	80	-	125

Objectives:

1. Introduction   [2 hour]
    1.1 Definitions
    1.2 Goals of AI
    1.3 Challenges of AI
    1.4 AI approaches
    1.5 AI techniques
    1.6 Applications of AI
2. Agents   [5 hour]
    2.1 Introduction to agents
    2.2 Agent's performance
    2.3 Example of Agents
    2.4 Rationality and omniscience
    2.5 Types of agent environment
    2.6 Agent architecture
    2.7 PEAS (vaccum cleaner agent, human agent, robotic agent, taxi driving agent, 8-queen problem etc)
    2.8 Types of agent (simple reflex, goal based, model based, utility agent, learning agent)
3. Problem solving using searching [8 hours]
    3.1 Uninformed Search
        3.1.1   Problem solving agents
        3.1.2   Problem types
        3.1.3   Problem formulation

      3.1.4   Example problems

      3.1.5   Basic search algorithms (BFS, DFS, Depth limited search, uniform cost search, iterative deepening, bidirectional search)

      3.1.6   Comparative study of all uninformed search strategies (completeness, optimality, time complexity and space complexity)

  3.2 Informed search

      3.2.1   Best first (greedy) search

      3.2.2   A* Search

      3.2.3   Heuristic function

      3.2.4   Hill Climbing and problems

      3.2.5   Comparative Study of each type of searching

      3.2.6   Simulated annealing

      3.2.7   Genetic Algorithm

4. Adversial Search and Constraint satisfaction problem [5 hours]

  4.1 Games

  4.2 Perfect games

  4.3 Game tree and formal definition

  4.4 Min Max problem

  4.5 Alpha beta pruning algorithm

  4.6 CSP Problem and examples

  4.7 Crypto arithmetic problems and solutions

5. Knowledge Representations [8 hours]

  5.1 Knowledge and its types

  5.2 Logic

  5.3 Semantic Nets

  5.4 Propositional logic vs FOPL

  5.5 Resolution in FOPL

  5.6 Frames

6. Learning System   [4 hours]

  6.1 Rote learning

  6.2 Learning from example: inductive learning methods

  6.3 Decision trees

  6.4 Explanation based learning

  6.5 Reinforcement learning

7. Reasoning   [4 hours]

  7.1 Monotonic Reasoning

  7.2 Statistical Reasoning (Bayesian Network)

  7.3 Uncertainty in reasoning

  7.4 Case based reasoning

8. Expert System   [4 hours]

  8.1 Human Expert vs expert system

  8.2 Expert System Structure

  8.3 Expert system example

8.4 Characteristics of expert system

8.5 Knowledge acquisition

8.6 Knowledge base

8.7 Inference engine

8.8 Forward chaining and backward chaining

8.9 Design of expert system

9. Artificial Neural networks   [3 hours]

9.1 Research history

9.2 Model of artificial neuron

9.3 Neural networks architectures

9.4 Learning methods in neural networks

9.5 Perceptron Network, Multi-layered feed forward network, Hopfield networks

9.6 Application of neural networks

10. Natural language processing   [2 hours]

10.1   introduction

10.2   components of natural language processing

10.3   natural language understanding

10.4   natural language generation

10.5   steps in language understanding and generation

Laboratory

Students must do labs on prolog, C or java to cover following topics

- solving family relation problem
- GCD in prolog
- Tower of Hanoi
- Wumpus world
- Using prolog to understand (variable, rules, input output, arithmetic operations, recursion in prolog)

Students must do case study on expert system or natural language processing also.

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Objectives:

- To develop entrepreneurship skills and leadership in practical fields

1. The Foundations of Entrepreneurship   [4 hrs]
    a. The World of Entrepreneur

    b. What is an Entrepreneur?

    c. The Benefits of Entrepreneurship

    d. The Potential Drawbacks of Entrepreneurship

    e. Behind the Boom: What's Feeding the Entrepreneurial Fire?

    f. The Cultural Diversity of Entrepreneurship

    g. The Power of Small Business

    h. The Ten Deadly Mistakes of Entrepreneurship

    i. Putting Failure into Perspective

    j. How to Avoid the Pitfalls

2. Inside the Entrepreneurial Mind: From Ideas to Reality   [4hrs]

a. Creativity, Innovation, and Entrepreneurship

   b. Creativity – A Necessity for Survival

   c. Creative Thinking

   d. Barriers to Creativity

   e. How to Enhance Creativity

   f. The Creative Process

   g. Techniques for Improving the Creative Process

   h. Intellectual Property: Protecting Your Ideas

3. Designing a Competitive Business Model and Building a Solid Strategic Plan [3 hrs]
   a. Building a Competitive Business Model and Building a Solid Strategic Plan

   b. The Strategic Management Process

4. Conducting a Feasibility Analysis and Crafting a Winning Business Plan [4 hrs]
   a. Conducting a Feasibility Analysis

   b. Why Develop a Business Plan?

   c. The Elements of Business Plan

   d. What Lenders and Investors Look for in Business Plan

   e. Making the Business Plan Presentation

   f. Business Plan Format

5. Forms of Business Ownership [2 hrs]
   a. Brief Introduction to Various Forms of Ownership

6. Building a Powerful Marketing Plan [5 hrs]
   a. Building a Guerilla Marketing Plan

   b. Pinpointing the Target Market

   c. Determining Customer Needs and Wants through Market Research

   d. Plotting a Guerilla Marketing Strategy: How to Build a Competitive Edge

   e. Marketing on the World Wide Web

   f. The Marketing Mix

7. Pricing Strategies [5 hrs]

      a.   Three Potent Forces: Image, Competition and Value

      b.   Pricing Strategies and Tactics

      c.   Pricing Strategies and Methods for Retailers

      d.   Pricing Concepts for Manufacturers

      e.   Pricing Strategies and Methods for Service Firms

      f.   The Impact of Credit on Pricing

8. Creating a Successful Financial Plan [4 hrs]
      a.   Basic Financial Statements

      b.   Creating Projected Financial Statements

      c.   Ratio Analysis

      d.   Interpreting Business Ratios

      e.   Break-Even Analysis

9. Managing Cash Flow [5 hrs]
      a.   Cash Management

      b.   Cash and Profits Are Not the Same

      c.   The Cash Budget

      d.   Preparing a Cash Budget

      e.   The 'Big Three' of Cash Management

      f.   Avoiding the Cash Crunch

10. Sources of Financing: Debt and Equity [4hrs]
      a.   Planning for Capital Needs

      b.   Equity Capital versus Debt Capital

      c.   Sources of Equity Financing

      d.   The Nature of Debt Financing

11. Choosing the Right Location and Layout [5 hrs]
      a.   Location: A Source of Competitive Advantage

      b.   Location Criteria for Retail and Service Businesses

c. Location Options for Retail and Service Businesses

d. The Location Decision for Manufacturers

e. Layout and Design Considerations

f. Layout: Maximizing Revenues, Increasing Efficiency, or Reducing Costs

Text Book:

- Essentials of Entrepreneurship and Small Business Management, 5th Edition ,Thomas W. Zimmerer and Norman M. Scarborough

SIMULATION AND MODELING
BEG471CO

Year IV
Semester: I

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Course Objectives: This course provides the discrete and continuous system, generation of random variables, and analysis of simulation output and simulation languages.

1. Concept of simulation   **6 hr**
1.1 Introduction
1.2 The system
1.3 Continuous and discrete systems
1.4 System simulation
1.5 Real time simulation
1.6 When to use simulation
1.7 Types of simulation model
1.8 Steps in simulation study
1.9 Phases of simulation study
1.10 Advantages of simulation

1.11 Limitations of the simulation Technique
1.12 Areas of applications

2. Monte Carlo Method   4 hr
2.1 Monte Carlo Method
2.2 Normally distribution random number
2.3 Monte Carlo Method V/S stochastic Simulation

3. Simulation of Continuous systems   5 hr
3.1 A pure Pursuit Problem
3.2 Continuous system models
3.3 Analog Computer
3.4 Analog Methods
3.5 Hybrid Simulation
3.6 Feedback Systems
3.7 Differential and Partial Differential Equations and its Engineering Purpose

4. Queuing System   5 hr
4.1 Elements of Queuing System
4.2 Characteristics of Queuing System
4.3 Types of Queuing System
4.4 Queuing Notation
4.5 Measurement of System Performance
4.6 Application of Queuing System
4.7 Markov Chain

5. Verification & Validation of Simulation Models   5 hr

5.1 Model building
5.2 Verification & Validation
5.3 Verification of Simulation Models
5.4 Calibration & Validation of Models

6. Random Number   8 hr

6.1 Random Numbers
6.2 Random Number Tables
6.3 Pseudo Random Numbers
6.4 Generation of Random Numbers
6.5 Mid square Random Number generator
6.6 Qualities of an efficient Random Number generator
6.7 Testing Numbers for Randomness
6.8 Uniformity Test
6.9 Chi-square Test
6.10 Testing for auto correlation
6.11 Poker Test

7. Analysis of simulation Output   5 hr
7.1 Estimation Methods
7.2 Simulation run statistics
7.3 Replication of runs

7.4 Elimination of internal bias

8. Simulation Language   **7 hr**
8.1 Basic concept of Simulation tool
8.2 CSSLs, GPSS
8.3 Discrete systems modeling and simulation
8.4 Continuous systems modeling and simulation
8.5 Structural, data and control statements hybrid simulation
8.6 Feedback systems: typical application

Laboratories
Laboratory exercises using simulation and modeling package, at the end of this course last student must do a project on simulation using simulation and modeling package.

Recommended Books

1. G. Gordan, "System Simulation", Prentice Hall of India.
2. M. Law and R.F. Perry, "Simulation: A problem solving approach", Addison Wesley publishing company.
3. M. Law and W.D. Kelton,"Simulation Modeling and Analysis", Mc Graw Hill, 1991.
4. Jerry Banks, John S.Carson II, Barry L. Nelson, Devid M. Nicol, P.Shahabudden: Discrete – Event System Simulation
5. R.Y. Rubinstein, B. Melamed: Modern Simulation And Modelling

Software Engineering

BEG 472CO

Year VI   Semester: I

Teaching Schedule Hours per Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	**2**	-	**20**	-	**80**	-	**100**

COURSE OBJECTIVES:

This course is intended to provide an introduction to SE concepts and practices focusing on industrial software development characteristics and processes, development models, and the software life cycle for mid-scale system.

- Provide students a comprehensive introduction to software engineering.

- provide the students the kinds of activities that are necessary for developing a software system
- Study the important phases of software development

UNIT I:

Introduction to Software Engineering:

- Definition of Software engineering
- The evolving role of software
- Changing Nature of Software
- Characteristics of Software
- A Generic view of software Engineering
- Software engineering- layered technology.   (4 hrs)

UNIT II:

Process models:

- The waterfall model
- Prototyping Model
- RAD Model
- Spiral Model.   (5 hrs)

UNIT III:

Software Project Management

- Meaning**of People,Product,Process,Project** in Software Project Management
- Activities of Project Plannin
- Project Estimation techniques
- COCOMO
- Risk Management
- Project Scheduling
- Staffing
- Software Configuration Management (SCM)   (8 hrs)

UNIT IV:

Software Requirements and Specification

- Functional and non-functional requirements,
- Requirements engineering process(Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management)
- Data Modeling and flow diagram
- Software Prototyping Techniques
- Requirement definition and specification.   (7 hrs)

UNIT V:

Software Design

- Introduction to Software Design
- Characteristics of a good Software Design
- Design Principal
- Design concepts
- Design Strategy
- Design process and Design quality
- Software Architecture and its types   (7 hrs)

UNIT VI:

Software Testing

- Software testing Process
- Principal of Testing
- Test Case design
- Black-Box Testing(Boundary Value Analysis,Equivalence class Partitioning)
- White-Box testing(Statement Coverage,Path coverage,Cyclomatic complexity)
- Software Verification and Validation.   (7 hrs)

UNIT VII:

Metrics for Process and Products

- Software Measurement

- Metrics for software quality
- Software Quality Assurance
- Software reliability
- The ISO 9000 quality standards. (5 hrs)

UNIT VIII:

Introduction to Engineering Software Trends and Technology

- Agile Development
- Extreme Programming
- Cloud Computing and Grid Computing
- Enterprise Mobility
- Business Intelligent and Approaches
    - ERP, Supply Chain Management, Service Oriented Architecture and web services
    - Enterprise Portals and Content Management
- Introduction to OOSE

Case Studies

Students are encouraged to perform the case study to implement concepts of above-mentioned topics.

References:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition.McGrawHill International Edition.

2. Software Engineering- Sommerville, 7th edition, Pearson education.2004

3. Software Engineering (*Latest Edition*), Udit Agrawal

4. Fundamentals of Software Engineering (*Latest Edition*), Rajib Malla

5. Software Engineering – A precise Approach (*Latest Edition*), Pankaj Jalote

Question Pattern

Type	Number of Questions	Total Marks	Chapters
Long Questions	2 Questions out of 3	2X12=24	All Chapters
Short Questions	7 Questions out of 9	7X 8 =56	All Chapters

Project
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Year IV
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2	1	-	20			80	100

Objectives:

- To develop practical knowledge in emerging computer science and technologies.
- To implement academic knowledge in practical fields

Guidelines of Project Work

Students are required to submit project on any one of the emerging technology. Project should be application based reflecting real time scenarios.

Following activities must be followed during project.
1. Proposal submission
2. Proposal defense
3. Midterm defense
4. Final defense
5. Project documentation