Part-IV, Even Semester

CSE 4211: Artificial Intelligence

Credits: 3 **Contact Hours:** 39
Year: Four **Semester:** Even

Prerequisite: CSE2131: Discrete Mathematics, STAT2111: Theory of Statistics
Motivation To introduce students to the basic concepts and techniques of Artificial Intelligence (AI).

Course Objective:
The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning. Also introduces students to Prolog language as a tool for programming AI related problems. Additionally the course develops an understaning of some applications areas of AI, including Neural Network, Fuzzy logic and Robotics.

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **understand** the key components of the artificial intelligence (AI) field and its relation and role in Computer Science.	P1	
CLO2	To **explain** propositional and predicate logic and their roles in logic programming.	P2	P1
CLO3	To **identify** and **explain** artificial intelligence techniques, including search heuristics, knowledge representation, automated planning and agent systems, machine learning, and probabilistic reasoning.	P2	P4
CLO4	To **develop** a basic proficiency in a traditional AI	P3	P2
CLO5	To master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and robotics.	P5	P6

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√			√	√	√
CLO2	√		√	√	√	√
CLO3		√	√	√	√	√
CLO4		√	√		√`	√

Course Contents:

Introduction: History of AI - Intelligent agents – Structure of agents and its functions - Problem spaces and search - Heuristic Search techniques – Best-first search - Problem reduction - Constraint satisfaction - Means Ends Analysis.

Knowledge Representation: Approaches and issues in knowledge representation- Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution - Weak slot - filler structure – Strong slot - filler structure.

Reasoning under uncertainty: Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.

Planning and Learning: Planning with state space search - conditional planning-continuous planning - Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning.

AI programming languages: Introduction to PROLOG, knowledge representation, domain, predicate, clauses, database, back tracking, unification, list, and compound object using prolog.

Introduction to selected topics in AI: Neural Networks, Expert system, Robotics and Fuzzy logic.

Text Book:

1. Staurt J. Russel and Peter Norvig : **Artificial Intelligence: A modern Approach**, *Pearson Education Asia*
2. D. W. Patterson : **Introduction to Artificial Intelligence and Expert System**,*Prentice-Hall of India*
3. Carl Townsend : **Introduction to Turbo Prolog**, *Sybex Inc.*

Reference Books:

1. Patrick Henry Winston : **Artificial intelligence**, *Pearson Education Inc*.
2. N. P. Padhy : **Artificial Intelligence and Intelligent System**, *Oxford University Press*
3. Elaine Rich, Kevin Knight and ShivashankarB.Nair : **Artificial Intelligence**,*Tata McGraw-Hill*

CSE4212: Artificial Intelligence Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on CSE4211

CSE 4221: Web Engineering

Credits: 3 **Contact Hours:** 39
Year: Four2 **Semester:** Even

Prerequisite: CSE3151: Computer Networks
Motivation To provide students with conceptual and practical knowledge, and skills required to develop web applications and web services.

Course Objective:
The course introduces students to the discipline of web Engineering including the methods and techniques used in web-based system development. In contrast to traditional software engineering, web engineering methods and techniques must incorporate unique aspects of the problem domain such as: document oriented delivery, fine-grained lifecycles, user-centric development, client-server legacy system integration and diverse end user skill levels. This course draws upon student's previous programming and computing experience to develop practical web development and maintenance skills. This course is intended for students with knowledge of both Internet communication concepts and an introductory programming knowledge (Java &Javascript)..

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **understand** the basic concepts and techniques of web engineering.	P1	
CLO2	To **identify** and **discuss** the security risk of a Web application.	P2	P4
CLO3	To **apply** the web engineering methodologies for Web application development.	P2	P3
CLO4	To **develop** a web application using server side programming languages and components.	P3	P5
CLO5	To **develop** a component based web solution and use UML diagrams to describe such a solution.	P5	P6

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√			√	√	√
CLO2	√		√	√	√	√

CLO3		√	√	√	√	√
CLO4		√	√		√`	√

Course Contents:

Web Engineering: Attributes of Web based system and Application, Web App Engineering Layers, Web Engineering Process

Web App Project: Formulation Web based Systems, Planning for Web Engineering Project, Building Web Engineering Team, Web App Project Management, Metrics for web engineering and Apps.

Web Apps Analysis: Requirement Analysis, Analysis Model, Web Apps Estimation, Content Model.

Web Apps design: Design issues of Web Apps, Interface Design, Typography, Layout design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Object Oriented Hypermedia Design, Design Metrics for web Apps.

Web Apps Implementation: Client side scripting: Java Script, AJAX, JQuery; Server Side Scripting: ASP.NET, PHP; Framework: PHP MVC frameworks (Code Igniter, Symfony, Zend, CakePHP) ASP.NET MVC Framework, Web Service.

Web Apps Security: Encryption techniques (digital signatures, certificates, PKI), Security threats, Securing client/server interactions, Vulnerabilities at the client (desktop security, phishing, etc.) and the server (cross-site scripting, SQL injections, etc.), Building Secure Web Apps.

Testing Web Apps: Content Testing, User Interface Testing, Navigation Testing, Configuration Testing, Security Testing, Performance Testing.

Maintenance of Web Applications: Web Server and Database server load balancing, web apps performance assessment, Application usage monitoring and report generation

Text Book:

1. Roger Pressman and David Lowe : **Web Engineering**, *Tata McGraw Hill Edition*, 2008

Reference Books:

1. Dino Esposito : **Programming Microsoft ASP.NET 2.0**, *Microsoft Press, 2005*
2. Matt J. Crouch : **ASP.NET and VB.NET web programming**, *Pearson, 1st Edition, 2002*

CSE4222: Web Engineering Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on CSE4221

CSE 4231:Cryptography and Network Security

Credits: 3 **Contact Hours:** 39
Year: Four **Semester:** Even

Prerequisite: ICE 3261: Communication Engineering
Motivation To know basic of cryptography and network security, different secure protocol, network security issues

Course Objective:

The main objective of this course is to completely understand what ICT security is and how real scenarios can be affected by the lack of security. Students will learn how cryptography can support security and why this is not sufficient, needing to be embodied into shared standards. The course provides also an overview on other tools used for guaranteeing the security of networks, applications, and systems. Students will become familiar with the main attack techniques and will be able to choose and use secure protocols and other tools/systems for security that are indispensable for network administration and design of secure applications.

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **illustrate** various Public key and Symmetric key cryptographic techniques.	P1	P2
CLO2	To **apply** various security mechanisms.	P3	
CLO3	To **analyze** the vulnerabilities in any computing system and hence be able to design a security solution.	P3	P4
CLO4	To **evaluate** authentication protocols and requirements.	P6	
CLO5	To **solve** the intrusion attacks.	P12	

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√			√	√	√
CLO2	√			√	√	√
CLO3		√	√	√	√	
CLO4		√	√		√	
CLO5			√		√	

Course Contents:

Overview: Cryptography Overview and Terminologies.

Symmetric Ciphers: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography, Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Evaluation Criteria for AES, The AES Cipher, Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, RC4 Stream Cipher, Placement of Encryption Function, Traffic Confidentiality, Key Distribution.

Number theory: Fields, algebraic closures, Integers - divisibility, primes, testing primes, factorization, Euclideanalgorithm

Public-Key Encryption: Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management.

Network Security:

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, MD5 Message Digest Algorithm, Secure Hash Algorithm, Digital Signatures, Authentication Protocols.

Network Security Practice: Kerberos, Pretty Good Privacy, S/Mime, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Web Security Considerations, Secure Socket Layer and Transport Layer Security.

System Security: Intruders, Intrusion Detection, Password Management, Viruses and Related Threats, Virus Countermeasures, Firewalls.

Text Book:

1. Bruce Schneier : **Applied Cryptography**, *John Wiley & Sons.*
2. W. Stallings : **Cryptography and Network Security Principles and Practice**, *Prentice Hall.*

Reference Books:

1. Dieter Gollmann : **Computer Security**, *John Wiley and Son.*
2. E. Biham and A. Shamir : **Differential Crypt Analysis of the Data Encryption Standard**, *Springer Verlag.*

CSE4232: Cryptography and Network Security Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 262 Contact hours

Laboratory works based on CSE4231

CSE4241: Wireless Communication

Credits: 3 **Contact Hours:** 39
Year: Four **Semester:** Odd

Prerequisite: ICE 3261: Communication Engineering
Motivation To know the basics of wireless communication and design principle of wireless networks.

Course Objective:
The necessity of wireless communications is increasing day by day, especially in enterprise environment. Network designers have to face different challenges of designing collision free wireless communication. In order to be prepared for tomorrows challenges, CS graduates need to have some core knowledge about wireless communication and designing a wireless enterprise network. The objective of this course is to provide such core designing concept to the CS graduates.

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **explain**different terminologies and techniques of wireless communication.	P1	
CLO2	To **demonstrate** the concept of cellular mobile communications.	P1	
CLO3	To **apply**different security principles for ensuring secure wireless communication.	P2	P5
CLO4	To**analyze** real-world issues and designthe core architecture of a reliable wireless network accordingly.	P3	P5

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√			√	√	√
CLO2	√		√	√	√	√
CLO3		√	√	√	√	
CLO4		√	√		√	

Course Contents:

Introduction To Wireless Communication Systems: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

Introduction to Cellular Mobile Systems: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems.

Cellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.

Multiple Access Techniques For Wireless Communication: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks. Wireless LAN Technogy - IEEE 802.11 Wireless LAN Standard - Bluetooth.

Intelligent Cell Concept And Application: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Text Book:

1. William Stallings : **Wireless Communications and Networks**, *Prentice Hall*
2. Theodore S. Rappaport : **Wireless Communications**, *Pearson Education*

Reference Book:

1. John G. Proakis : **Digital Communications**, *McGraw-Hill International*
2. W.C.Y.Lee; : **Mobile Cellular Telecommunication**,*McGraw Hill*
3. JochenSchille : **Mobile Communications**,*Pearson*

CSE4242: Wireless Communication Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on CSE4241

CSE4251: Multimedia System

Credits: 3 **Contact Hours:** 39
Year: Four**Semester:** Even

Prerequisite: CSE4181:Digital Image Processing, CSE3151;Computer Networks
Motivation To know the issues of multimedia data format, properties and applications.

Course Objective:
The objective of this course is to acquire knowledge and skills required to plan, design and implement multimedia systems and technologies. This course teaches the principles and current technologies of multimedia systems, describes the ways in which multimedia information is captured, processed, and rendered and the major steps in some of the image, video and audio compression standards. It also introduces multimedia quality of service (QoS) and analyses the ways in which multimedia data is transmitted across networks. Privacy and copyright issues in the context of multimedia are discussed.

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **understand** the key components of multimedia technologies, applications and the characteristics of each media type including text, graphics, voice, video and animation.	P1	P2
CLO2	To **explain** approaches to represent multimedia data in digital format and identify their properties, data organization, indexing, retrieval and finally, the implications of copyright in the use of multimedia.	P2	P3
CLO3	To **describe** multimedia operating system issues such as real-time operation, resource management, process management, file systems, and Multimedia networking.	P3	P4
CLO4	To **analyze** image, video and audio in the frequency domain to identify important components to be encoded, the protocols, standards and representation techniques used for storage and transmission of multimedia information.	P2	
CLO5	To **compare** different network protocols and to describe mechanisms for providing QoS guarantees in the network.	P4	
CLO6	To **apply** multimedia data and techniques on a practical application.	P3	P5

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√				√	√
CLO2	√		√	√	√	√
CLO3		√	√	√	√	√
CLO4		√	√	√	√`	
CLO5		√	√	√	√	
CLO6			√		√	

Course Contents:

Multimedia systems: introduction; Coding and compression standards; Architecture issues in multimedia.

Operating systems issues in multimedia: real-time OS issues, synchronization, interrupt handling.

Database issues in multimedia: indexing and storing multimedia data, disk placement, disk scheduling, searching for a multimedia document.

Networking issues in multimedia: Quality-of-service guarantees, resource reservation, traffic specification, hoping and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions;

Security issues in multimedia: digital water-marking, partial encryption schemes for video streams.

Multimedia applications: audio and video conferencing, video on demand, voice over IP.

Text Book:

1. Ze-Nian Li and Mark S. Drew : **Fundamentals of Multimedia**, *Pearson*

Reference Books:

1. John Villamil-Casanova and Louis Molina : **Fundamentals of Multimedia**, *Pearson*
2. Tay Vaughan : **Multimedia: An Introduction**, Prentice Hall India.
3. Ranjan Parekh : **Multimedia: Making It Work**, *McGraw-Hill*
4. Jose Lozano, Louis Molina and John Willif : **Principles of Multimedia**,*Tata McGraw-Hill, 2007.*

CSE4252: Multimedia System Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on CSE4251

CSE4261: Distributed Database Management System

Credits: 3 **Contact Hours:** 39
Year: Four **Semester:** Odd

Prerequisite: CSE3151: Computer Networks,CSE3121 Database Management Systems
Motivation To accrue adequate knowledge about the distributed environment, distributed file-system and database management system.

Course Objective:

Gigantic amount of data is generated in our daily life. And the volume is increasing day by day. Conventional DBMS are not sufficient to manage and process these enormous amounts of data. Distributed database management systems are different from conventional DBMS. To be able to manage and process these huge amounts of data CS graduates must have a clear understanding of DDBMS.

CLO (Course Learning Outcome):			
CLOs	After successfully completing this course, students will be able	**PLO mapping**	
CLO1	To **explain** the different terminologies and techniques related to distributed database management system (DDBMS).	P1	
CLO2	To **demonstrate** different architectures of DDBMS.	P1	
CLO3	To **design** efficient query for DDBMS.	P2	P3
CLO4	To **design**, **deploy**and maintainDBMS.	P2	P3

Evaluation/ Assessment System: Students are evaluated out of total **75 Marks**. There are different types of assessment tools. In **the final written** examination, total time **is 3 hours** where students should answer Six questions from two sections out of Eight taking not more than Three from each section. The detail with **COs-Assessment Mapping** is given below.

CLOs	Assessment Tools (Total 100%)					
	20%				70%	10%
	Class Test 1	Class Test 2	Assignment	Presentation	Final Written	Attendance
CLO1	√			√	√	√
CLO2	√		√	√	√	√
CLO3		√	√	√	√	
CLO4		√	√		√`	

Course Contents:

Introduction: Distributed Data processing, Distributed database system (DDBMSS), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS Relational Database concepts, Normalization, Integrity rules, Relational Data Languages, Relational DBMS

Distributed DBMS Architecture: DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control

Overview of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing Introduction To Transaction Management: Definition of Transaction, Properties of transaction, types of transaction

Distributed Concurrency Control:Serializability theory, Taxonomy of concurrency control mechanisms, locking bases concurrency control algorithms. Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture.

Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, Object query processing. Transaction management. Database Interoperability: Database Integration, Query processing.

Text book

1. M.T. Ozsu and P. Valduriez : **Principles of Distributed Database Systems**,*Pearson.*
2. S. Ceri and G. Pelagatti : **Distributed Databases principles and systems**,*Tata McGraw Hill*
3. Andrew S. Tanenbaum : **Distributed Database**,*Pearson*.

CSE4262: Distributed Database Management System Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

CSE4280: Board Viva-Voce

50 Marks [100% Viva-voce]
2 Credits

The Board viva-voce will be conducted by the Examination Committee.

CSE4292: Thesis/Project (Part-II)

50 Marks [(35% Internal Examiner, 35% External Examiner, 30% Presentation and Oral]
2 Credits, 52 Contact hours

This course is a continuation of the course CSE 4192 (Part- I) from the odd semester Part- IV. A student has to complete the defended project proposal, submit it by the end of the semester and make an oral defense of the project.