Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari College of Computer Application
Semester-7 (BCA)

Subject: Artificial Intelligence – BCAXX17407

Type of course: Major Core

Prerequisite: Basic knowledge of programming concepts (preferably in C, C++ or Python), understanding of data structures (such as stacks, queues, trees and graphs), fundamentals of discrete mathematics (logic, sets, and relations), and basic problem-solving skills.

Rationale:

Artificial Intelligence (AI) has shifted from a theoretical discipline to a foundational tool for modern software development, making it essential for BCA students to master Generative AI and Agentic systems. This course bridges the gap between traditional logic and current industry trends by focusing on **Prompt Engineering** and **Large Language Models (LLMs)**, ensuring students can optimize AI outputs for real-world tasks like code generation and data summarization. By exploring the architecture of generative models and the conceptual framework of tokens and embeddings, students move from being mere users to understanding the underlying mechanics of modern AI.

The curriculum emphasizes practical application through **API integration** and **AI Agent design**, preparing students to build and deploy intelligent applications using OpenAI APIs and frameworks like Streamlit. It addresses critical system design perspectives, including data flow, AI visualization, and cybersecurity, while maintaining a strong focus on ethics, bias, and responsible AI use. Ultimately, this syllabus equips students with the technical and analytical skills required to design autonomous, goal-based agents and navigate the evolving landscape of AI in business and automation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				SEE		CCE			
CI	T	P	C	Theory	Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: *CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE- Continuous and Comprehensive Evaluation; ALA- Active Learning Activities*

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical
SEE 100 Marks will be converted in to 50 Marks
CCE 100 Marks will be converted in to 50 Marks
It is compulsory to pass in each individual component.

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	**Unit 1 : Introduction to Artificial Intelligence** : What is Artificial Intelligence (AI), evolution and scope of AI, tasks AI can solve, concept of modern AI systems, AI in real-world applications, harnessing AI in organizations, the human side of AI (human-AI interaction, impact on society), overview of AI system architecture, introduction to problem-solving concepts and knowledge in AI systems, Types of AI System	9	20%
2	**Unit 2 : Prompt Engineering & AI Interaction:** Introduction to Prompt Engineering (concept of prompts, importance in modern AI systems, human-AI interaction), Types of Prompting Techniques (Zero-shot prompting, Few-shot prompting, Role-based prompting, Chain-of-thought prompting), Prompt Design Techniques (Instruction-based prompts, context setting, constraints specification, output formatting), Prompt Optimization & Refinement (iterative prompting, prompt debugging, improving response accuracy and relevance), Applications of Prompt Engineering (content generation, code generation, data summarization, decision support systems), Limitations & Challenges (incorrect outputs, hallucination, bias in responses, security and ethical concerns).	9	20%

3	**Unit 3 : Generative AI Systems & LLM** Introduction to generative AI, types of generative models and their applications, architecture of generative AI systems (input, model, output flow), concept of data-driven content generation, development workflow of generative AI systems (data, training, inference – conceptual), responsible use of generative AI and output validation, Introduction to Large Language Models (LLMs), building blocks of LLMs (tokens and embeddings – conceptual), training methodologies and techniques (pre-training and fine-tuning – basic idea), working of LLMs in real-world systems	9	20%
4	**Unit 4: AI APIs, OpenAI Integration & Deployment** Introduction to AI APIs and API-based AI systems, working of OpenAI APIs (request-response model, prompt input, model processing, output generation), API structure (endpoints, headers, authentication using API keys), JSON-based communication, integration of AI into software systems (web applications, mobile applications, backend services), building AI powered applications using APIs, concept of model inference (real-time and batch processing), introduction to deployment of AI applications (local and cloud-based deployment), tools for rapid AI application development (Streamlit or similar frameworks), performance considerations (latency, cost), basic security practices in API usage	9	20%
5	**Unit 5: AI Agents, System Design & Real-world Applications** Introduction to AI agents and agentic AI, types of agents (reactive, goal-based, utility-based), AI agent workflows and task automation, system-level integration of AI in applications, AI in software systems (web, mobile, cloud platforms), AI visualization (data insights, dashboards, decision support visualization), AI in real-world domains (cybersecurity, business systems, automation), system design perspective of AI applications (data flow, decision flow), ethical considerations and future trends in AI systems.	9	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Comparative Analysis of AI Systems:** Students will perform two tasks using two different AI tools and compare their outputs to determine which performs better for each task. Prepare a Comparison report and upload it into GMIU Portal.	10

2	**Interactive Prompting:** Faculty gives one common theme to everyone. Each student writes their own prompt to an AI, collects output.Take Screenshots and upload that file in GMIU Portal.	10
3	**AI Blind Spot – Explore, Imagine & Report:** Students will identify at least 5 fields where AI has not yet reached, explain why AI is absent and how it could help in the future — and also select one AI-present field to write a short report on its current use and future growth possibilities. Prepare a report and upload it into GMIU Portal.	10
4	**AI Career Survey :** Students will research AI job roles across 3 platforms and select a field of interest. They must perform a skill-gap analysis and solve 3 LeetCode problems relevant to that specific field. Submit the report and screenshots to the GMIU Portal.	10
5	**Specialization Synergy – AI's Role in My Career :** Students will research and identify how Agentic AI and Automation specifically transform their chosen specialization (Cloud, Cyber Security, Data Science, or Web/Mobile). They must explain one real-world problem in their field that a Goal-based or Utility-based agent can solve more efficiently than a human. Upload that report in GMIU Portal.	10
Total		**50**

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	45%	15%	15%	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	**Analyze** the evolution of AI and the architecture of modern AI systems, focusing on the relationship between human-AI interaction and its impact on society.

CO2	**Design and optimize** advanced prompts using techniques such as few-shot and chain-of-thought to improve the accuracy and relevance of AI-generated outputs.
CO3	**Explain** the architecture and workflow of Generative AI and Large Language Models (LLMs), including the conceptual role of tokens, embeddings, and fine-tuning.
CO4	**Develop and deploy** AI-powered applications by integrating OpenAI APIs and using rapid development frameworks like Streamlit.
CO5	**Evaluate** the design and ethical implementation of autonomous AI agents (goal-based and utility-based) within real-world domains like cybersecurity and business automation.

List of Practical

Sr. No	Descriptions	Unit No	Hrs
1	Design and implement a simple intelligent agent using rule-based decision making. Demonstrate reactive and goal-based behavior using conditions and decision logic.	1	2
2	Perform Zero-shot and Few-shot prompting for tasks like sentiment analysis, email generation, and summarization. Compare outputs based on quality and accuracy.	2	2
3	Design and implement role-based prompting by assigning different roles and analyze variation in responses.	2	2
4	Implement Chain-of-Thought prompting for reasoning and problem-solving tasks. Compare outputs with normal prompting techniques.	2	2
5	Implement prompt engineering applications including content generation, code generation, resume generation, and text summarization using AI tools.	2	2
6	Implement text generation using a pre-trained generative AI model.	3	3
7	Perform tokenization of text using Python libraries and analyze token count, embeddings concept, and token usage cost estimation.	3	3
8	Develop a simple AI-powered application using OpenAI API (or similar API) with prompt input and response generation.	4	4
9	Develop a basic AI-powered web application using Streamlit framework with user input, API integration, and dynamic output generation.	4	4
10	Implement JSON-based communication for AI API integration including request creation, response parsing, and error handling.	4	3
11	To build an **Agentic AI system using a pre-trained model and library**, where the agent can take input, use tools, and generate output.	5	3

Total	**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] How ChatGPT and Other AI Tools Will Revolutionize Business. Apress.- Taulli, Tom. Generative AI.

[2] Artificial Intelligence: A Modern Approach - Stuart Russell, Peter Norvig.

[3] Prompt Engineering: The Art of Asking. Independently Published. - Palaghat, Yaswanth Sai.

[4] Generative AI & LLMs - Joseph Babcock, Raghav Bali .

[5] AI Engineering: Building Applications with Foundation Models - Chip Huyen.

[6] Designing Machine Learning Systems - Chip Huyen.