MAHATMA GANDHI UNIVERSITY

Kottayam, Kerala

Undergraduate Programmes (HONOURS)
2025 Admission Onwards

SYLLABUS						
SIGNATURE COURSE						
Name of the College	NSS College, Rajakumari					
Faculty/ Discipline	Electronics with Computer Technology					
Programme	BSc (Hons) Electronics with Computer Technology					
Course Coordinator	Dr. Saritha M					
Contributors						
Course Name	Foundations of Large Language Models					
Type of Course	DSE					
Specialization title	This Signature Course does not have a specialization.					
Course Code	MG5DSEECTA00					
Course Level	300					
Course Summary	This course introduces the fundamental concepts behind Large Language Models (LLMs) and Natural Language Processing (NLP). Students learn the evolution of NLP techniques, neural architectures such as Transformers, and the development of AI applications using modern LLM APIs.					
Semester	5	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	Lecture	Tutorial	Practical	Others	
		4				60
Pre-requisites, if any	Basic Python Programming Skill					

Course Outcomes (CO)

Number of COs		**4**	
CO No.	**Expected Course Outcome**	**Learning Domains ***	**PO No**
1	Explain the fundamentals of Artificial Intelligence and Large Language Models.	U	PO1, PO2
2	Describe Natural Language Processing concepts, including tokenization and embeddings.	U	PO1, PO2
3	Analyze the architecture of transformer-based language models.	An	PO4, PO5
4	Implement simple applications using LLM APIs in Python.	A	PO4, PO5

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	-	-	-	-	-	-	-	-

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 2	3	3	-	-	-	-	-	-	-	-
CO 3	-	-	-	3	3	-	-	-	-	-
CO 4	-	-	-	3	3	-	-	-	-	-

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Introduction to AI and Generative AI			
	1.1	Overview of Artificial Intelligence History and evolution of AI Machine Learning vs Deep Learning vs Generative AI	2	["1"]
	1.2	Basics of Natural Language Processing (NLP) Definition of Language Model Evolution of Language Models ◦ Rule-based systems ◦ Statistical models ◦ Neural networks	3	["1"]
	1.3	Introduction to Large Language Model (LLM) Examples of LLM-based tools ◦ ChatGPT ◦ OpenAI 8. Everyday applications of LLMs ◦ Chatbots ◦ Content generation ◦ Coding assistants ◦ Education tools	3	["1"]
	1.4	Activities • Identify AI vs non-AI systems • List daily tools that use NLP • Compare Google search vs AI chatbot responses	2	["1"]
2	Natural Language Processing Fundamentals			
	2.1	Text preprocessing techniques: Text as data Tokens and tokenization Stopword removal	3	["2"]
	2.2	Word embeddings, Word prediction idea (next-word prediction), Training data (books, articles, code – concept only)	4	["2"]
	2.3	Introduction to training. Parameters, Pre-training vs fine-tuning (high-level), Why LLMs sometimes make mistakes (hallucinations	4	["2"]
	2.4	Activities • Predict the next word in a sentence (human vs AI) • Token counting activity • Observe AI errors and discuss why they happen	4	["2"]

Module	Units	Course Description	Hrs	CO No.
3	Large Language Model Architecture			
	3.1	Introduction to Attention Mechanisms Self-attention mechanism Multi-head attention mechanism	5	["3"]
	3.2	Transformer architecture Encoder and decoder structures	4	["3"]
	3.3	Pre-training and fine-tuning of models Examples of transformer models	5	["3"]
	3.4	Overview of models such as GPT, BERT, and LLaMA	3	["3"]
4	LLM APIs and Application Development			
	4.1	Introduction to LLM APIs Prompt-based interaction with models Temperature and generation parameters	3	["4"]
	4.2	Building simple chatbots Question answering systems Summarization systems	6	["4"]
	4.3	Ethical considerations in LLMs: Data privacy and security Hallucinations and misinformation Over-reliance on AI Academic integrity and plagiarism Responsible AI usage	3	["4"]
	4.4	Projects based on the above concepts	6	["4"]

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** The course will follow a blended learning approach combining conceptual understanding with practical exposure to modern AI tools. The teaching methodology will focus on progressive learning, from the theoretical foundations of Natural Language Processing to the practical implementation of Large Language Model applications.

Assessment Types	**MODE OF ASSESSMENT** Mode of Assessment: Practical **A. Continuous Comprehensive Assessment (CCA)** **• Practical – 30 Marks** Weekly experiments, Lab Assignments, Mini Project, Viva Voce **B. End Semester Evaluation (ESE)** **• Practical – 70 Marks** Assessment Methods – Problem Definition, System Design, Implementation, Innovation, Documentation, Presentation and Viva Duration of Examination – 2.00 Hrs

References

- Speech and Language Processing – Daniel Jurafsky and James H. Martin, Pearson / Prentice Hall. Natural Language Processing with Transformers – Lewis Tunstall, Leandro von Werra, and Thomas Wolf, O'Reilly Media. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig, Pearson Education. Practical Natural Language Processing – Sowmya

Vajjala, Bodhisattwa Majumder, Anuj Gupta, and Harshit Surana, O'Reilly Media. Deep Learning – Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT Press. AI Engineering – Chip Huyen, O'Reilly Media.

Suggested Readings

- Online Resources: Stanford University – Natural Language Processing Lecture Notes Hugging Face – Transformers Documentation and Tutorials OpenAI – LLM API Documentation DeepLearning.AI – Generative AI Learning Resources Research Papers: Attention Is All You Need – Ashish Vaswani et al., 2017. (The foundational paper introducing the Transformer architecture.) Language Models are Few-Shot Learners – Tom B. Brown et al., 2020. (Introduces the concept of few-shot learning in large language models.)

Affidavit

- We, NSS College, Rajakumari and Dr. Saritha M, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, NSS College, Rajakumari, agree to appoint a new course coordinator for the proposed Foundations of Large Language Models in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the signature course, for as long as the college offers this programme.
- We, NSS College, Rajakumari and Dr. Saritha M, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.