

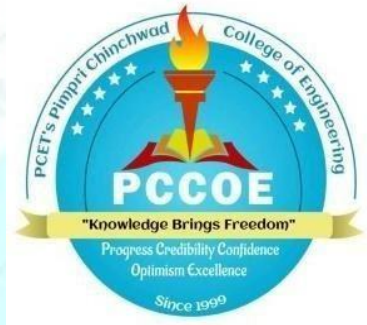
Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune

DEPARTMENT OF COMPUTER ENGINEERING



Curriculum Structure and Syllabus of Honors in Deep Learning (Regulations 2023)



Academic Year 2026-28

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value-Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

“We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers, and entrepreneurs through Quality Education.

We are committed for Institute’s social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS).”

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	Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering
Course Approval Summary	

A) Board of study - Department of Computer Engineering

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS
1	Neural Networks and Deep Learning	BCE25HN05	5	
2	Deep Learning Laboratory	BCE25HN06	7	
3	Advanced Deep Learning	BCE26HN05	10	
4	Advanced Deep Learning Laboratory	BCE26HN06	12	
5	Large Language Model	BCE27HN05	15	
7	Project	BCE28HN05	20	

Approved by Academic Council:

Chairman, Academic Council

Pimpri Chinchwad College of Engineering

Preface

Looking at Global Scenario to enhance the employability skills and impart deep knowledge in emerging/ multidisciplinary areas, an additional avenue is provided to passionate learners through the Minors and Honours Degree Scheme in academic structure.

For **Honors degree** program, student has to earn additional 18 credits in emerging area of one's own domain.

Objectives of Honors Degree

- ☐ To enable students to pursue allied academic interest in contemporary areas.
- ☐ To provide effective yet flexible options for students to achieve basic to intermediate level competence in the contemporary area.
- ☐ To enhance the employability skills with different combinations of competencies and flavors.
- ☐ To provide an academic mechanism for fulfilling demand of specialized areas from industries for higher order skill jobs.
- ☐ To provide a strong foundation to students aiming to pursue research/ higher studies in the contemporary field of study.

Preface of Honors in Deep Learning

The growth in AI is owed to the fact that quintillions of data is generated each day, which makes these technologies more relevant, stronger and beneficial in today's age. Virtual assistants, translators, chatbots, driverless vehicles, and many more applications are the result of these futuristic technologies. The Deep Learning approach of AI provides a foundation for problem solving that impacts virtually all areas of the economy, including science, engineering, medicine, banking, finance, sports and the arts. Deep learning is an interdisciplinary field that mimics the functioning of the human brain to find correlations and patterns by processing data with a specified logical structure. Deep learning models use multiple hidden layers in the neural network as opposed to traditional neural networks that only contain a handful of hidden layers. Deep learning algorithms map inputs to already learned data to deliver an accurate output. The concept underpinning this technology is very similar to how our brain functions (biological neural networks). Deep learning models are trained by using large sets of labeled data and neural network architectures that automate feature learning without the need for manual extraction.

Learning Objective

Honors courses in Deep Learning will enable learners to build expertise in Deep Learning, starting from essential theoretical foundations to learning how to apply them in the real world effectively. The programme creates a practical understanding of how Deep learning algorithms can be developed and optimized for hardware. Such systems can be used in cutting edge research where power and performance are the major constraints. The start of course will cover the foundation of Neural networks and Deep learning. Each unit will cover different models starting off with fundamentals such as Linear Regression, and logistic/softmax regression. Followed by Feedforward deep neural networks, the role of different activation functions, normalization and dropout layers. Then Convolutional Neural Networks and Transfer learning will be covered. Finally, several other Deep learning methods will be covered. The laboratory sessions will cover fundamentals of deep learning and its applications including speech, text, image, and video processing. The advanced stage of course will cover the practice of essential tools such as Tensorflow, Keras, PyTorch etc. It also includes project work for learners to implement and develop problem solving abilities for real problems.

What you will learn

- Build DL models with neural network and other tools to build & train models for prediction & classification tasks.
- Build & train a neural network with TensorFlow/Pytorch to perform multi-class classification, & build and deploy such models.
- Apply best practices for development & use unsupervised learning techniques for unsupervised learning including clustering & anomaly detection
- Build recommender systems with a collaborative filtering approach & a content-based deep learning method & build a deep reinforcement learning model

Learning Outcome

The course will teach you how to develop deep learning models using recent frameworks. The course will start with introduction to the DL framework. Then each section will cover different models starting off with fundamentals such as Linear Regression, and logistic/softmax regression. Followed by Feedforward deep neural networks, the role of different activation functions, normalization and dropout layers. Then Convolutional Neural Networks and Transfer learning will be covered. Finally, several other Deep learning methods will be covered.

After completing this course, learners will be able to:

- Apply and Demonstrate the knowledge of Deep Neural Networks and related machine learning methods
- Use the Python libraries for Deep Learning applications
- Build Deep Neural Networks using recent DL frameworks
- Evaluate the performance of DL models on bench mark and real world datasets

INDEX

Sr. No.	Content	Page No.
1	List of Abbreviations in Curriculum Structure	1
2	Curriculum Structure	2
3	Course Syllabus of Semester – V Courses	4
4	Course Syllabus of Semester – VI Courses	9
5	Course Syllabus of Semester – VII Courses	14
6	Course Syllabus of Semester – VIII Courses	19
7	Vision and Mission of Computer Engineering Department	21

LIST OF ABBREVIATIONS IN CURRICULUM STRUCTURE

Sr. No.	Abbreviation	Expansion
1.	L	Lecture
2.	P	Practical
3.	T	Tutorial
4.	H	Hours
5.	CR	Credits
6.	FA1	Formative Assessment 1
7.	FA2	Formative Assessment 2
8.	SA	Summative Assessment
9.	TW	Term Work
10.	OR	Oral
11.	PR	Practical
12.	PROJ	Project

Curriculum Structure

Honors in Deep Learning

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CURRICULUM STRUCTURE

Structure for Honors in Deep Learning (Computer Engineering)

Semester	Coursecode	Course Name	Teaching Scheme				CR	Evaluation Scheme						
			L	P	T	H		FA1	FA2	SA	TW	PR	OR	Total
V	BCE25HN05	Neural Networks and Deep Learning	3	-	-	3	3	20	20	60	-	-	-	100
V	BCE25HN06	Deep Learning Laboratory	-	4	-	4	2	-	-	-	50	-	-	50
VI	BCE26HN05	Advanced Deep Learning	3	-	-	3	3	20	20	60	-	-	-	100
VI	BCE26HN06	Advanced Deep Learning Laboratory	-	4	-	4	2	-	-	-	50	-	-	50
VII	BCE27HN05	Large Language Model	3	2	-	5	4	20	20	60	50	-	-	150
VIII	BCE28HN05	Project	-	8	-	8	4	-	-	-	100	-	50	150
	Total		9	18	-	27	18	60	60	180	250	-	50	600

L-Lecture, P-Practical, T-Tutorial, H-Hours, Cr-Credits, FA-Formative Assessment, SA-Summative Assessment, TW-Term Work, OR-Oral, PR Practical

Course Syllabus
Semester – V
Honors in Deep Learning

Program:	B. Tech. (Computer) - Honors in Deep Learning					Semester: V	
Course:	Neural Networks and Deep Learning					Code: BCE25HN05	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
3	3	-	-	20	20	60	100
Prior knowledge of Linear Algebra, Probability Theory, Machine Learning, Artificial Neural Network, Python programming language is essential							
Course Objectives: This course aims at enabling students: 1. Learn fundamental concepts of artificial neural network 2. Introduce neural network architecture and its training 3. Learn fundamental concepts of convolution neural network 4. Understand the Recurrent neural network							
Course Outcomes: After learning the course, the students will be able to: 1. Illustrate fundamental concept of neural network. 2. Design neural network architecture to solve real world problem. 3. Evaluation the performance of neural network architecture. 4. Use convolution neural network to solve real world problems. 5. Develop practical solutions for real-world problems using RNNs.							
Detailed Syllabus							
Unit	Description						Duration (H)
I	Neural Networks: Introduction to Neural Network, Biological neuron, Model of Artificial Neuron, Learning rules and activation functions: ReLU, Sigmoid, Softmax and others, Loss, function - L1, L2 - Function approximation, classification / clustering problems – Performance parameters for classification and regression, Applications						9
II	Neural Network Architecture: Single layer Feed-forward networks. Multi-layer Feed-forward networks, forward propagation, Back Propagation networks, Architecture of Back-propagation (BP) Networks, Back-propagation Learning, Learning the weights, Chain rule, Stochastic gradient descent, Sigmoid units, and vanishing gradient,						9
III	Effective training in Deep Neural Network- early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization, Minibatch gradient descent, Data Augmentation, Stratification, Generalization Gap –						9

	Under-fitting Vs Over-fitting, Optimization: Momentum, Learning rate schedules, AdaGrad, RMSProp and Adam optimization, and Batch Normalization, Initialization – weights, Bias	
IV	Convolution Neural Network: Basic structure of Convolutional Network, Convolutions for Images, Padding and Stride, Multiple Input and Multiple Output Channels, Pooling, FCNN, Advanced Architectures: VGG16/19, AlexNet, ResNet, and others, Transfer learning, CNN for Image Classification.	9
V	Recurrent Neural Network: Introduction, architecture, training in RNN, variants of RNN: LSTM, GRU, Bidirectional RNN, applications	9
Total		45
Text Books: 1. Ian Goodfellow Yoshua Bengio Aaron Courville , Deep Learning, , MIT Press, 2017 2. Michael Nielsen, Neural Networks and Deep Learning, , Determination Press 3. Aggarwal, Charu C. Neural networks and deep learning. Vol. 10. No. 978. Cham: springer, 2018.		
Reference Books: 1. Jacek M. Zurada, "Introduction to artificial neural systems", West Publishing Co., 1992, ISBN: 0-3 14-93391 - 3. 2. Bishop C. M., "Pattern Recognition and Machine Learning", Springer, 2006, ISBN: 978-0-387-31073-2 3. Applied Deep Learning. A Case-based Approach to Understanding Deep Neural Networks, 4. Umberto Michelucci, Apress, 2018. 5. Deep Learning with Python", Francois Chollet, Manning Publications, 2017.		

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Program:	B. Tech. (Computer Engineering)			Semester: V			
Course:	Deep Learning Laboratory			Code: BCE25HN06			
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	-	50
Prior knowledge of Machine learning algorithms and Python programming language, Working with an anaconda environment, Managing the python packages and multiple anaconda environments is essential							
Course Objectives: - To illustrate simple neural networks and deep neural networks. - To interpret the model results and analyze the accuracy of the model. - To explain different preprocessing operations on structured data or on unstructured data. - To explain how to predict the results using a trained model.							
Course Outcomes: After learning the course, the students will be able to: - Design neural network layers for various learning problems. - Demonstrate binary as well as multi- class classification problems. - Interpret the model results and analyze the performance of the model. - Implement, train, and validate their own neural network							
Guidelines for Students: - The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment. - Each assignment write-up should have Title, Objectives, Outcomes, Theory- Concept in brief, dataset used, data description, Conclusion, Assessment grade/marks and assessor's sign. - Program codes with sample output of all performed assignments are to be submitted as softcopy.							
Guidelines for Laboratory/Term Work Assessment: - Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students. - Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage. - Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality, and neatness.							
Guidelines for Laboratory Conduction - Operating System recommended: - 64-bit Open-source Linux or its derivative - Programming tools recommended: - Python, OpenCV - Use of Anaconda platform is encouraged.							
Detailed Syllabus							
Suggested List of Assignments							
Assignment No.	Assignment Title						
1.	Implement a multilayer perceptron (MLP) model for prediction such as house prices.						
2.	Implement logistic regression classifier in machine learning.						

3.	Implement multiclass classification algorithm using feed forward neural network.
4.	Implement and evaluate a Multiclass classifier using the CNN model.
5.	Implement and evaluate a Multiclass classifier using the transfer learning.
6.	Implement and analyze performance of stock price prediction with recurrent neural network.
References: 1. Jacek M. Zurada, "Introduction to artificial neural systems", West Publishing Co., 1992, ISBN: 0-3 14-93391-3 2. Goodfellow I., Bengio Y., and Courville A., "Deep Learning", MIT Press, 2016, ISBN: 978-0262035613. 3. Bishop C. M., "Pattern Recognition and Machine Learning", Springer, 2006, ISBN: 978-0-387-31073-2 Web references: 1. https://www.youtube.com/watch?v=oXlwWbU812o 2. https://www.datacamp.com/community/tutorials/exploratory-data-analysis-python 3. https://www.analyticsvidhya.com/blog/2020/02/learn-image-classification-cnn-convolutional-neural-networks-3-datasets/	

Course Syllabus
Semester – VI
Honors in Deep Learning

Program:	B. Tech. (Computer) - Honors in Deep Learning					Semester: VI	
Course:	Advanced Deep Learning					Code: BCE26HN05	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
3	3	-	-	20	20	60	100
Prior knowledge of Linear Algebra, Probability Theory, Machine Learning, Artificial Neural Network, Python programming language is essential							
Course Objectives: This course aims at enabling students: 1. Use deep neural network for object detection and segmentation. 2. Use Deep learning in nlp.							
Course Outcomes: After learning the course, the students will be able to: 1. Implement object detection methods for analyzing objects in a given image. 2. Apply deep generative model to represent complex data distributions and to generate new data samples that are similar to the training data. 3. Apply deep learning techniques to solve natural language processing (NLP) problems. 4. Analyze the effectiveness of attention models and transformers in sequential data processing.							
Detailed Syllabus							
Unit	Description						Duration (H)
I	CNN for object detection: overview, challenges in object detection, region based CNN, single shot multibox detector, YOLO, anchor box and multiscale detection, Evaluation metrics						9
II	CNN for segmentation: image segmentation, autoencoder, U-net, segmentation loss function, applications						9
III	Deep Generative Models: Introduction of GANs(Generative Modeling) , Different Types of GANs, Components of GANs, Training and Prediction of GANs, Brief on GAN Loss Function, Challenges Faced by GANs, Application of GANs, Variational Autoencoders and Disentanglement,						9
IV	Introduction to NLP and Deep Learning: introduction to NLP, Word Vector representation, word2vec model, Continuous Skip-Gram model, Continuous Bag-of-Words model, Language modelling and neural network, Information Retrieval tasks using Neural Networks- Learn to Rank, Understanding Phrases, analogies.						9

V	Attention Models and Transformers: Attention in Vision Models: An Introduction, Soft and Hard Attention: Image Captioning, Self-Attention and Transformers, Transformers to Vision Transformers, Transformers for Detection, Transformers for Segmentation, Stable diffusion model: LDM, Latent space, Text to image generation.	9
Total		45
Text Books: 1. Michael Nielsen, Neural Networks and Deep Learning, 2016 2. Zaccane, G., Karim, M. R., Menshawy, A. "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017. 3. Ian Goodfellow Yoshua Bengio Aaron Courville , Deep Learning, , MIT Press, 2017		
Reference Books: 1. Yoav Goldberg. A Primer on Neural Network Models for Natural Language Processing 2. Jacek M. Zurada,"Introduction to artificial neural systems", West Publishing Co., 1992, ISBN: 0-3 14-93391 - 3. 3. Bishop C. M., "Pattern Recognition and Machine Learning", Springer, 2006, ISBN: 978-0-387-31073-2 4. Applied Deep Learning. A Case-based Approach to Understanding Deep Neural Networks, Umberto Michelucci, Apress, 2018. 5. Deep Learning with Python", Francois Chollet, Manning Publications, 2017		
e-sources: https://web.stanford.edu/class/archive/cs/cs224n/cs224n.1184/syllabus.html		

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Program:	B. Tech. (Computer Engineering)			Semester: VI			
Course:	Advanced Deep Learning Laboratory			Code: BCE26HN06			
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	-	50
Prior knowledge of Deep Learning and Python programming language, Working with an anaconda environment, Managing the python packages and multiple anaconda environments is essential							
Course Objectives: - To demonstrate various tools and techniques available in the field of deep Learning. - To apply an appropriate deep learning model for a given real world problem. - To implement various deep unsupervised techniques available in the field of deep learning							
Course Outcomes: After learning the course, the students will be able to: - Apply the recent tools and techniques to implement deep learning algorithms - Experiment and evaluate the performance of object detection and segmentation models - implement a basic GAN model and train it on a dataset to generate - Design and develop deep learning models nlp. - Design and develop advance deep learning model using Attention Mechanisms and Transformer models.							
Guidelines for Students: - The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment. - Each assignment write-up should have Title, Objectives, Outcomes, Theory- Concept in brief, dataset used, data description, Conclusion, Assessment grade/marks and assessor's sign. - Program codes with sample output of all performed assignments are to be submitted as softcopy.							
Guidelines for Laboratory/Term Work Assessment: - Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students. - Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage. - Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality, and neatness.							
Guidelines for Laboratory Conduction - Operating System recommended: - 64-bit Open-source Linux or its derivative - Programming tools recommended: - Python, OpenCV - Use of Anaconda platform is encouraged.							
Detailed Syllabus							
Suggested List of Assignments							
Assignment No.	Assignment Title						
1.	Implement Auto-encoders for any of the task.						
2.	Implement and evaluate an object detection model using deep learning techniques.						

3.	Implement and evaluate a segmentation model using deep learning techniques.
4.	Implement a Generative Adversarial Network (GAN) to generate synthetic images.
5.	Implement and evaluate deep learning model for natural language processing application.
6.	Implement modern deep learning architecture using Attention Mechanisms and Transformer models.
References: 1. Murphy, K. P., "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012. 2. Alpaydin, E., "Introduction to Machine Learning", MIT Press, Prentice Hall of India, 3rd Edition 2014. 3. Zaccane, G., Karim, M. R., Menshaw, A. "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017. Web references: 1. NPTEL :: Computer Science and Engineering - NOC:Deep Learning- Part 1 2. Deep Learning - Course (nptel.ac.in)	

Course Syllabus
Semester – VII
Honors in Deep Learning

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Program:	B. Tech. (Computer) - Honors in Deep Learning					Semester: VI				
Course:	Large Language Model					Code: BCE27HN05				
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks						
	Lecture	Practical	Tutorial	FA		SA	TW	PR	OR	Total
				FA1	FA2					
4	3	2	-	20	20	60	50	-	-	150
Prior knowledge of Machine learning, deep learning fundamentals, Transformers and NLP basics is essential										
Course Objectives: This course aims at enabling students: 1. To Develop an understanding of transformer architectures and scaling principles underlying modern Large Language Models. 2. To Enable students to apply pretraining, tokenization, and fine-tuning techniques for building and adapting LLMs. 3. To equip students with skills to design prompt-based systems and retrieval-augmented generation (RAG) pipelines for real-world applications. 4. To analyze and evaluate deployment strategies, optimization techniques, and ethical considerations in LLM-based systems.										
Course Outcomes: After learning the course, the students will be able to: 1. Analyze transformer scaling and architectures used in LLMs 2. Apply pretraining techniques and tokenization methods for LLMs 3. Implement fine-tuning and alignment techniques for LLM adaptation 4. Design prompt-based and retrieval-augmented LLM systems 5. Evaluate deployment, optimization, and ethical aspects of LLMs.										
Guidelines for Students for Lab: 1. The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment. 2. Each assignment write-up should have Title, Objectives, Outcomes, Theory- Concept in brief, dataset used, data description, Conclusion, Assessment grade/marks and assessor's sign. 3. Program codes with sample output of all performed assignments are to be submitted as softcopy.										
Guidelines for Laboratory/Term Work Assessment: 1. Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students. 2. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage. 3. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality, and neatness.										
Guidelines for Laboratory Conduction 1. Operating System recommended: - 64-bit Open-source Linux or its derivative 2. Programming tools recommended: - Python, OpenCV Use of Anaconda platform is encouraged.										

Detailed Syllabus		
Unit	Description	Duration (H)
I	Transformer Scaling and LLM Architectures Introduction to Transformer architecture (attention, encoder-decoder) Evolution to LLMs: Encoder-only (BERT-type) Decoder-only (GPT-type) Encoder-decoder (T5) Scaling laws in deep learning (Kaplan scaling laws) Model size vs data vs compute trade-offs Context window and token limits Positional embeddings (absolute vs rotary)	9
II	Pretraining and Tokenization at Scale Text preprocessing pipelines, Tokenization techniques: Byte Pair Encoding (BPE) Sentence Piece, Vocabulary construction, Pretraining objectives: Causal Language Modeling (CLM), Masked Language Modeling (MLM), Dataset construction and cleaning, Distributed training concepts: Data parallelism, Model parallelism	9
III	Fine-Tuning and Alignment of LLMs Transfer learning in NLP Fine-tuning strategies: Full fine-tuning, Parameter-efficient fine-tuning (PEFT), LoRA (Low-Rank Adaptation), Instruction tuning, Reinforcement Learning from Human Feedback (RLHF,) Evaluation metrics: Perplexity, BLEU, ROUGE	9
IV	Prompt Engineering and RAG Systems Prompt engineering: Zero-shot, few-shot learning, Chain-of-thought reasoning, Prompt templates, Embeddings and semantic search, Vector databases (FAISS concept), Retrieval-Augmented Generation (RAG): Architecture, Pipeline design, Context injection and grounding	9
V	Deployment, Optimization, and Ethics Model optimization: Quantization, Pruning, Efficient inference techniques, API-based deployment vs local deployment, Cost-performance trade-offs, Hallucination and mitigation techniques, Bias and fairness in LLMs, Responsible AI and governance	9
Total		45
Suggested List of Assignment 1. Design and implement a text preprocessing pipeline for a given corpus and analyze different tokenization techniques used in Large Language Models. 2. Utilize pretrained transformer-based LLMs to perform multiple NLP tasks and analyze their performance. 3. Design and evaluate different prompting strategies to improve the performance of LLMs in reasoning and text generation tasks. 4. Fine-tune a pretrained LLM on a domain-specific dataset using parameter-efficient techniques. 5. Develop a document-based question-answering system using Retrieval-Augmented Generation (RAG) architecture.		

6. Design and deploy a real-world LLM-based application with optimization techniques and evaluate its performance.

Text Books:

1. Tunstall L., von Werra L., Wolf T., "Natural Language Processing with Transformers", O'Reilly Media, 2022, ISBN: 978-1098103247
2. Raschka S., "*Build a Large Language Model (From Scratch)*", Manning Publications, 2024, ISBN: 978-1633437165

Reference Books:

1. Yoav Goldberg. A Primer on Neural Network Models for Natural Language Processing
2. Jurafsky D., Martin J. H., "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition with Language Models", 3rd Edition, Pearson (Draft/Online), 2026,
3. Kadry S., Balasubramaniam S., Prasanth A., Dhanaraj R. K., "Generative AI and LLMs: Natural Language Processing and Generative Adversarial Networks", De Gruyter, 2024, ISBN: 978-3111424637

Course Syllabus
Semester – VIII
Honors in Deep Learning

Program:	B. Tech. (Computer Engineering)			Semester: VIII			
Course:	Project			Code: BCE28HN05			
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
4	-	8	-	100	50	-	150
Course Objectives: 1. To follow SDLC meticulously and meet the objectives of proposed work. 2. To apply recent tools and techniques. 3. To develop the solutions and conduct experimentations. 4. To validate and evaluate the work undertaken. 5. To consolidate the work as a furnished report. 6. To present project management skills in a team.							
Course Outcomes: After learning the course, the students will be able to: 1. Identify technical ideas and its relevance in recent tools and technologies. 2. Implement the methods relevant to the problem statement. 3. Critically analyze the results and their interpretation. 4. Demonstrate working models and prepare good quality technical reports. 5. Present knowledge of team work.							
Guidelines for Project: 1. Students shall identify a real-world deep learning problem, conduct a literature review, and follow the complete SDLC for design and implementation using modern tools and techniques. 2. The project must include development of baseline and improved models with proper experimentation using different parameters and configurations. 3. Results should be validated using appropriate metrics, with comparative analysis, interpretation, and discussion of limitations and future scope. 4. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is duly certified by the concerned guide and head of the Department/Institute.							

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Optimism, Excellence

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Vision and Mission of Computer Department

Department Vision

To be a premier Computer Engineering Department by achieving excellence in Academics and Research for creating globally competent and ethical professionals.

Department Mission

M1: To develop technologically competent and self-sustained professionals through contemporary curriculum.

M2: To nurture innovative thinking and collaborative research, making a positive impact on society.

M3: To provide state-of-the art computing environment and learning opportunities through Center of Excellence.

M4: To foster leadership skills and ethics with holistic development.