Government College of Engineering Aurangabad, ChhatrapatiSambhajinagar

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Department of Computer Science and Engineering

Curriculum

Honours B. Tech. (CSE)

From Academic Year 2026-27
As per NEP

Dr. Vikul Pawar
Head,CSE

Dr. Anil Karwankar
Dean Academics

Approved Curriculum in XXXIst Academic Council Meeting
Dated: 03rd February 2026

Table of Contents

Honours Subject

Students will opt semester wise following courses for Honours degree in AIML. Intelligent System Group:

Sr. No.	Category	Course Code	Course Title	Sem.	Hours per week			Total Credits
					Lecture	Tutorial	Practical	
1	Honours	CSHNC0010	Modern Artificial Intelligence	V	3	1	0	**04**
2	Honours	CSHNC0020	Advance Computer Vision	VI	3	1	0	**04**
3	Honours	CSHNC0030	Generative AI	VII	3	1	1	**05**
4	Honours	CSHNC0040	Deep Learning for NLP	VIII	3	0	0	**03**
5	Honours	CSHNC0050	Honours Project	VIII	0	0	2	**02**
Total Credits								**18**

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CSHNC0010: Modern Artificial Intelligence

Teaching Scheme		Examination Scheme	
Lectures (Hours/Week)	**3**	ISE I (Marks)	**15**
Tutorials (Hours/Week)	**1**	ISE II (Marks)	**15**
Credits	**4**	ISE III (Marks)	**10**
		ESE (Marks)	**60**

Course description

To acquaint students with the meaning, purpose, scope, stages, applications, and effects of AI. To share the basic tasks and algorithms in Machine Learning .To provide understanding of how system learns in supervised learning

Course Outcomes

After successful completion of the course, students will be able to:

CO1: Understand the basics of Artificial Intelligence and Intelligent Agents, including the foundations, history, and rational behavior in diverse environments.

CO2: Apply problem-solving strategies using search algorithms, both uninformed and heuristic, for solving real-world AI problems.

CO3: Analyse complex search environments and formulate solutions using local search, partial observability, and constraint satisfaction techniques.

CO4: Demonstrate knowledge representation and reasoning skills using propositional logic, first-order logic, and inference methods.

CO5: Explore uncertainty handling and machine learning techniques, including probabilistic reasoning, Bayesian networks, and foundational supervised learning models.

Detailed Syllabus

UNIT I	**Introduction Artificial Intelligence and Intelligent Agents:** Introduction to AI ,The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art, Risks and Benefits of AI, Agents and Environments ,Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents .
UNIT II	**Approach for Problem-solving:** Problem-Solving Agents, Example Problems, Search Algorithms, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions. **Search in Complex Environments:** Local Search and Optimization Problems,Local Search in Continuous Spaces, Search with Nondeterministic Actions,Search in Partially Observable Environments,Online Search Agents and Unknown Environments. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems,Constraint Propagation: Inference in CSPs.

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UNIT III	**Knowledge, reasoning, and planning:** Logical Agents ,Knowledge-Based Agents,The Wumpus World,Logic,Propositional Logic: A Very Simple Logic,Propositional Theorem Proving,Effective Propositional Model Checking,Agents Based on Propositional Logic. First-Order Logic:Representation Revisited,Syntax and Semantics of First-Order Logic,Using First-Order Logic,Knowledge Engineering in First-Order Logic. Inference in First-Order Logic:,Propositional vs First-Order Inference,Unification and First-Order Inference,Forward Chaining,Backward Chaining. Knowledge Representation:Ontological Engineering,Categories and Objects,Events,Mental Objects and Modal Logic,Reasoning Systems for Categories,Reasoning with Default Information.
UNIT IV	**Uncertain knowledge and reasoning:** Acting under Uncertainty,Basic Probability Notation, Inference Using Full Joint Distributions,Independence, Bayes' Rule and Its Use,Naive Bayes Models. Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain,The Semantics of Bayesian Networks,Exact Inference in Bayesian Networks, Approximate Inference for Bayesian Networks,Causal Networks. Probabilistic Reasoning over Time: Time and Uncertainty, Inference in Temporal Models, Hidden Markov Models, Kalman Filters, Dynamic Bayesian Networks.
UNIT V	**Machine Learning:** Supervised Learning covers Supervised Learning, Learning Decision Trees, Model Selection and Optimization, The Theory of Learning, Linear Regression and Classification, Nonparametric Models, Ensemble Learning, and Developing Machine Learning Systems. Knowledge in Learning explores A Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevant Information, and Inductive Logic Programming.

Text Books

- "Artificial Intelligence For Dummies", J.P. Mueller and L. Massaron, Second Edition, For Dummies..
- "Artificial Intelligence: A Modern Approach", S.J. Russell and P. Norvig, Fourth Edition, Pearson Education, 2020.
- "Artificial Intelligence", NPTEL Online Course, https://nptel.ac.in/courses/106102220

Additional References

- John W. Creswell & J. David Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, SAGE Publications, (6th Edition, 2023).
- Wayne C. Booth, Gregory G. Colomb, & Joseph M. Williams, The Craft of Research, University of Chicago Press, (5th Edition, 2024).
- Robert K. Yin, Qualitative Research from Start to Finish, Guilford Press, (2nd Edition).
- NPTEL: Research Methodology – IIT Madras / IIT Kharagpur.
- NPTEL: Technical Communication for Scientists & Engineers – IIT Bombay
- NPTEL: Quantitative Research Methods – IIT Roorkee.
- Coursera: How to Write and Publish a Scientific Paper – ÉcolePolytechnique.

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Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3											1	3		
CO2	1														
CO3	2	2	1										2		
CO4	3	1	2		1				2	1			1	1	1
CO5	3	1			1				1	1		1	1	1	1
3 – High, 2 – Medium, 1 - Low															

Term Assessment:

ISE I and ISE II: In semester evaluations (ISE I and ISE II) of 15 marks, each will be based on Class Test I and Class Test II, respectively.

ISE III: Term work Assessment of 10 marks is based on one / or a combination of the following:

- Quiz
- Assignments
- Question and answer
- PowerPoint presentation

Assessment Pattern

Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	0			10
K2	Understand	10	10	5	20
K3	Apply	5	5	5	30
K4	Analyse				
K5	Evaluate				
Total Marks: 100		15	15	10	60

Assessment table

Assessment Tool	K1, K2	K3
	CO1,CO2	CO2, CO3, CO4, CO5
ISE I (15 Marks)	10	05
ISE II (15 Marks)	10	05
ISE III (10 Marks)	05	05
ESE Assessment (60 Marks)	30	30

CSHNC0020: Advanced Computer Vision

Teaching Scheme		Examination Scheme	
Lectures (Hours/Week)	**3**	ISE I (Marks)	**15**
Tutorials (Hours/Week)	**1**	ISE II (Marks)	**15**
Credits	**4**	ISE III (Marks)	**10**
		ESE (Marks)	**60**

Course description

The course will provide an overview of the challenges of vision, the common approaches and current techniques. While specific examples and applications may be used to illustrate, the focus will be on fundamental techniques and algorithms. We assume no prior knowledge of computer vision but still aim to study many modern, state-of-art techniques.

Course Outcomes

After successful completion of the course, students will be able to:

- **CO1:** Understand the fundamental concepts, applications of computer vision and study principles of image formation through geometric models. photometric properties
- **CO2:** Apply various methods of image segmentation and edge detection for isolate meaningful regions and boundaries in digital images.
- **CO3:** Interpret traditional object recognition techniques by extracting image features and applying classifiers
- **CO4:** Analyze the principles of neural networks and deep learning, including loss functions and optimization strategies of image classification models
- **CO5:** Apply vision transformer models for image classification and object detection, and apply Fully Convolutional Networks (FCNs)

Detailed Syllabus

UNIT I	Introduction Background, requirements and issues, human vision, Image formation: geometry and photometry Geometry, photometry (brightness and color), quantization, camera calibration
UNIT II	Image segmentation and Feature Extraction Various methods of image segmentation, edge detection, SIFT features Multi-view Geometry Shape from stereo and motion,
UNIT III	Object Recognition: Traditional methods Image features, Various classifiers (Nearest Neighbor, Bayes, SVM)
UNIT IV	Introduction to Neural Networks and Deep Learning Neural networks, loss functions, optimization methods, Image Classification and Object Detection LeNet, AlexNet, VGG, ResNet, Efficient Net RCNN, Faster RCNN, YOLO, SSD, FPN
UNIT V	Vision Transformers Transformer architecture, application to image classification and object detection, Fully Convolutional Networks

Text Books & References

- "Computer Vision: A Modern Approach", D. Forsyth and J. Ponce, 2010.

- "Deep Learning: Algorithms and Applications", I. Goodfellow, Y. Bengio and A. Courville, 2017
- "A Guide to Convolutional Neural Networks for Computer Vision", S. Khan, H. Rahmani, S. Shah and M. Bennamoun, 2018
- "Computer Vision: Algorithms and Applications", Richard Szeliski, Second Edition, 2021; https://szeliski.org/Book/
- "Foundations of Computer Vision", A. Torralba, P. Isola and W.T. Freeman, MIT Press, 2024

Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3				1	2	3		2		1	
CO2	3	3	1	2				1	2	3		2		1	
CO3	3	3	1	3				1	2	3		2	2	1	3
CO4	2	3	1	3				1	2	3		2	2	1	3
CO5	2	3	1	3				1	2	3		2	2	1	3
3 – High, 2 – Medium, 1 - Low															

Assessment Pattern

Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	00	00	00	10
K2	Understand	10	05	02	15
K3	Apply	05	05	02	15
K4	Analyze	00	05	02	15
K5	Evaluate	00	00	02	05
K6	Create	00	00	02	05
Total Marks: 100		15	15	10	60

Assessment table

Assessment Tool	K1, K2	K3
	CO1, CO2	CO3, CO4, CO5
ISE I (15 Marks)	10	05
ISE II (15 Marks)	00	15
ISE III (10 Marks)	05	05
ESE Assessment (60 Marks)	30	30

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CSHNC0030: Generative AI

Teaching Scheme		Examination Scheme	
Lectures (Hours/Week)	**3**	ISE I (Marks)	**15**
Tutorials (Hours/Week)	**1**	ISE II (Marks)	**15**
Credits	**4**	ISE III (Marks)	**10**
		ESE (Marks)	**60**

Prerequisite

Knowledge of Python, linear algebra, and neural network.

Course description

This course provides a comprehensive exploration of Generative AI, beginning with its historical evolution and the fundamental shift from discriminative to generative modeling. This course covers cutting-edge techniques like Prompt Engineering, RLHF, and Retrieval Augmented Generation (RAG), alongside the practical use of open-source frameworks like Hugging Face and LangChain. Beyond technical implementation, the course emphasizes Ethical AI and Responsible AI, addressing critical issues like hallucinations and mode collapse. By the end, you will be equipped to fine-tune, program, and deploy sophisticated AI agents for diverse real-world use cases.

Course Outcomes

After successful completion of the course, students will be able to:

CO1: Understand the concepts of Generative Modeling.

CO2: Apply Gen AI to Generating Texts.

CO3: Apply Gen AI for generating Image.

CO4: Apply Gen AI for generating video.

CO5: Apply Open Source Tools for solving problems using Gen AI.

Detailed Syllabus

UNIT I	**Introduction to GEN AI** Historical Overview of Generative modeling - Difference between Gen AI and Discriminative Modeling, Importance of generative models in AI and Machine Learning Types of Generative models ,GANs,VAEs, autoregressive models and Vector quantized Diffusion models, Understanding if probabilistic, modeling and generative process Challenges of Generative Modeling ,Future of Gen AI, Ethical, Aspects of AI ,Responsible AI ,Use Cases.
UNIT II	**Generative models for Text** Language Models Basics , Building blocks of Language models -,Transformer Architecture , Encoder and Decoder ,Attention mechanisms - Generation of Text , Models like BERT and GPT models ,Generation of Text ,Autoencoding ,Regression Models , Exploring ChatGPT , Prompt Engineering, Designing Prompts– Revising Prompts using Reinforcement Learning from Human Feedback (RLHF),Retrieval Augmented Generation (RAG) – Multimodal LLM ,Issues of LLM like hallucination.

UNIT III	**Generation of Images** Introduction to Generative Adversarial Networks – Adversarial Training Process – Nash Equilibrium ,VariationalAutoencoders – Encoder-Decoder Architectures - Stable Diffusion Models ,Introduction toTransformer-based Image Generation ,CLIP ,Visual Transformers ViT- Dall-E2 and Dall-E3, GPT-4V,Issues of Image Generation models like Mode Collapse and Stability.
UNIT IV	**Generation of Painting, Music, and Play** Variants of GAN – Types of GAN - Cyclic GAN – Using Cyclic GAN to Generate Paintings Neural Style Transfer ,Style Transfer - Music Generating RNN, MuseGAN ,Autonomous agents, Deep Q Algorithm ,Actor-critic Network.
UNIT V	**Open source models and programming frameworks** Training and Fine tuning of Generative models ,GPT4All - Transfer learning and Pretrained models, Training vision models, Google Copilot - Programming LLM ,LangChain ,Open Source Models ,Llama - Programming for TimeSformer – Deployment – Hugging Face.

Text Books

- Denis Rothman, "Transformers for Natural Language Processing and Computer Vision", Third Edition ,Packt Books, 2024
- Omar Sanseviero" Hands-On Generative AI with Transformers and Diffusion Models"O'Reilly Media
- Valentina Alto" Modern Generative AI with ChatGPT and OpenAIModels"Packt Publishing

Additional References

- David Foster, "Generative Deep Learning", O'Reilly Books, 2024.
- AltafRehmani, "Generative AI for Everyone", BlueRose One, 2024

Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	2					1		1					
CO2	2	2	2	1						2	2				
CO3		2	3	3											
CO4			3	3					3						
CO5	3	2	3	2				2				3			
3 – High, 2 – Medium, 1 - Low															

Term Assessment:

ISE I and ISE II: In semester evaluations (ISE I and ISE II) of 15 marks, each will be based on Class Test I and Class Test II, respectively.

ISE III: Term work Assessment of 10 marks is based on one / or a combination of the following:

- Quiz
- Assignments
- Question and answer
- PowerPoint presentation

Assessment Pattern

Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	05	00	00	10
K2	Understand	05	05	00	10
K3	Apply	05	05	00	10
K4	Analyse	00	05	05	10
K5	Evaluate	00	00	00	20
K6	Create	00	00	05	00
Total Marks: 100		15	15	10	60

Assessment table

Assessment Tool	K1, K2	K3
	CO1,CO2	CO3, CO4, CO5
ISE I (15 Marks)	10	05
ISE II (15 Marks)	05	10
ISE III (10 Marks)	05	05
ESE Assessment (60 Marks)	20	40

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CSHNC0031: Lab Generative AI

Teaching Scheme		Examination Scheme	
Practical (Hours/Week)	**2**	ISE I (Term Work) (Marks)	**25**
Credits	**1**	ESE (Marks)	**25**

Course Outcomes

After successful completion of the course, students will be able to:

CO1: Design and implement basic Generative AI models.

CO2: Develop text, image, and data generation systems using Gen AI frameworks.

CO3: Implement cloud-based training and deployment of Generative AI models.

CO4: Develop end-to-end Generative AI applications integrating data, models, and deployment.

List of the Experiments

The student shall perform experiments of the following.

#	Title of the Experiments	Skill Level	CO	ISE Marks
1	To study the concept of Generative Artificial Intelligence and compare Generative Models with Discriminative Models.	S1	CO1	2
2	To implement probabilistic modeling techniques and generate synthetic data samples.	S2	CO1	2
3	To study the architecture of transformer-based language models and generate text using pretrained models.	S2	CO3	2
4	To design effective prompts and implement Retrieval Augmented Generation to reduce hallucination in large language models.	S3	CO2	3
5	To study the architecture and training process of Generative Adversarial Networks.	S3	CO3	3
6	To generate images using diffusion-based generative models such as Stable Diffusion.	S4	CO3	3
7	To generate artistic content using neural style transfer and GAN-based models.	S3	CO4	3
8	To train, fine-tune, and deploy open-source generative AI models.	S3	CO4	3

Term Work Assessment:

ISEI: In-Semester Evaluation of 25 marks each will be based on practical assignments completed and timely submission

End Semester Evaluation: In ESE of 25 marks Practical conduction and Oral Examination.

Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2		2							2	3	2	2
CO2	2	3		2	2							2	2	2	2
CO3	2	2	2		3					1		2	2	3	3
CO4	2	2	2		3	1				1		3	2	3	3
3 – High, 2 – Medium, 1 - Low															

Assessment Pattern

Level No.	Skill Level	ISE I	ESE
S1	Imitation	05	05
S2	Manipulation	10	10
S3	Precision	10	10
S4	Articulation	00	00
55	Naturalization	00	00
Total Marks: 50		25	25

Assessment table

Assessment Tool	S1	S2	S3
	CO1	CO2, CO3	CO4
Term Work (25 Marks)	00	10	15
Practical Examination & Viva Voce (25 Marks)	00	10	15
Total Marks: 50			

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CSHNC0040: Deep Learning for Natural Language Processing

Teaching Scheme		Examination Scheme	
Lectures (Hours/Week)	**3**	ISE I (Marks)	**15**
Tutorials (Hours/Week)	**1**	ISE II (Marks)	**15**
Credits	**4**	ISE III (Marks)	**10**
		ESE (Marks)	**60**

Prerequisite

Participants should have done a course on Machine Learning, and should know basics of Python Programming

Course description

Natural Language Processing finds its applications nearly everywhere -- be it Machine Translation, Question answering, Text Summarization, Dialogs, etc. In the last decade, Deep Learning based methods have given very good performance across a variety of NLP tasks, and have become a default choice for NLP problems. This course aims to give a thorough understanding of various deep learning architectures along with their specific use-cases in NLP.The course will also introduce the fundamental ideas behind training as well as fine-tuning/prompting the Large Language Models, which include in-context-learning, Parameter-efficient-fine-tuning, Reinforcement Learning through Human Feedback (RLHF). The course will also offer hands-on tutorials to help students master this subject.

Course Outcomes

After successful completion of the course, students will be able to:

- **CO1:** Analyze and Implement Word Embeddings and Sequence Models
- **CO2:** Design and Evaluate Transformer-based Architectures
- **CO3:** Apply Large Language Model (LLM) Optimization Techniques
- **CO4:** Integrate Human Feedback into Model Training.
- **CO5:** Develop and Deploy Practical NLP Solutions.

Detailed Syllabus

UNIT I	**Introduction to NLP** What is Natural Language Processing?, Text Processing Pipeline, Tokenization:, Text Normalization, Stemming and Lemmatization, Sentence Segmentation, N-gram Language Models , The Chain Rule of Probability, Markov Assumption, Maximum Likelihood Estimation (MLE), Calculations & Examples, The Zero Probability Problem, Introduction to Smoothing, NLP Tasks and Paradigms, Generative vs. Discriminative Models The Supervised Learning Framework, The Goal of Training, Optimization, Generalization vs. Overfitting.
UNIT II	**Introduction to deep learning** Shallow and Deep Neural Networks, Representation Learning, Gradient Descent: The Intuition of Gradient Descent, The Gradient Vector, The Update Rule Types of Gradient Descent, Challenges in Optimization ,Backpropagation: The Problem of Credit Assignment, The Computation Graph, The Chain Rule of Calculus, Step-by-Step Derivation, Local Gradients and Upstream Gradients, Multi-Dimensional Backpropagation (Vectorization),Activation Functions and their Gradients, Weight Initialization

UNIT III	**Recurrent Neural Networks** RNN LMs ,GRUs, LSTMs, Bi-LSTMs ,LSTMs for Sequence Labeling,LSTMs for Sequence to Sequence,Attention Mechanism,Sequence to Sequence with Attention,Transformers: Attention is all you need,Self-supervised learning (SSL), Pretraining,Designing SSL objectives ,Pretrained Bi-LSTMs: ELMO ,Pretrained Transformers: BERT, GPT, T5, BART, reinforcement learning from human feedback
UNIT IV	**Prompting Techniques** why does in-context learning work? ,advanced prompting techniques ,tool-aided language models ,automatic prompt engineering ,parameter-efficient fine-tuning, efficient fine-tuning for quantized lms ,other parameter efficient methods: pruning, distillation.
UNIT V	**Scaling laws of LLMs** modern LLMs and architecture variations - i ,:modern LLMs and architecture variations: positional embeddings ,long sequence modeling ,retrieval augmented generation ,model interpretability, model interpretability - multilingual ,model interpretability - iii ,trustworthy LLMs : taxonomy ,trustworthy LLMs: machine unlearning, Analysis and Interpretability, ethical considerations

Text Books

- Mihai Surdeanu& Marco Antonio Valenzuela-Escárcega, Deep Learning for Natural Language Processing: A Gentle Introduction, Cambridge University Press, (2024).
- Yoav Goldberg, Neural Network Methods in Natural Language Processing, Morgan & Claypool Publishers, (2017).
- Daniel Jurafsky& James H. Martin, Speech and Language Processing, Pearson/Prentice Hall, (3rd Edition Draft, 2025).

Additional References

- Lewis Tunstall, Leandro von Werra & Thomas Wolf, Natural Language Processing with Transformers, O'Reilly Media, (Revised Edition, 2022).
- Sebastian Raschka, Build a Large Language Model (From Scratch), Manning Publications, (2024).
- Stephan Raaijmakers, Deep Learning for Natural Language Processing, Manning Publications, (2022).
- https://nptel.ac.in/courses/108105572

Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	2					1		1					
CO2	2	2	2	1						2	2				
CO3		2	3	3											
CO4			3	3					3						
CO5	3	2	3	2				2				3			
3 – High, 2 – Medium, 1 - Low															

Term Assessment:

ISE I and ISE II: In semester evaluations (ISE I and ISE II) of 15 marks, each will be based on Class Test I and Class Test II, respectively.

ISE III: Term work Assessment of 10 marks is based on one / or a combination of the following:

- Quiz
- Assignments
- Question and answer
- PowerPoint presentation

Assessment Pattern

Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	05	00	00	10
K2	Understand	05	05	00	10
K3	Apply	05	05	00	10
K4	Analyse	00	05	05	10
K5	Evaluate	00	00	00	20
K6	Create	00	00	05	00
Total Marks: 100		15	15	10	60

Assessment table

Assessment Tool	K1, K2	K3
	CO1,CO2	CO3, CO4, CO5
ISE I (15 Marks)	10	05
ISE II (15 Marks)	05	10
ISE III (10 Marks)	05	05
ESE Assessment (60 Marks)	20	40

CSHNC0050: Honours Project

Teaching Scheme		Examination Scheme	
Practical (Hours/Week)	**4**	ISE I (Term Work) (Marks)	**25**
Credits	**2**	ESE (Marks)	**25**

Course Description:
This course develops students' ability to identify small-scale problems, carry out requirement analysis, design feasible solutions, and implement a functional prototype. It emphasizes experiential learning, teamwork, application of modern tools, innovation, documentation, and presentation in line with AICTE–NEP 2020 guidelines.

Course Objectives:

- Identify and formulate a simple technical/problem statement through brief literature/field study
- Work collaboratively in teams to design and implement feasible computing solutions
- Apply appropriate engineering fundamentals, development tools, and testing concepts
- Demonstrate documentation, presentation, ethical responsibility, and readiness for higher-level projects

Course Outcomes
After successful completion of the course, students will be able to:

CO1: Work constructively in a small project team
CO2: Identify problem objectives and define scope through brief literature review
CO3: Apply relevant tools/techniques to design and develop a mini-solution
CO4: Demonstrate testing, validation, documentation and presentation skills

Guidelines for Honours Project Work

1. Objective of the Honours Project

The Honours Project is intended to provide academically motivated students with an opportunity to undertake advanced, in-depth, and research-oriented project work beyond the regular curriculum. It aims to enhance innovation, critical thinking, research aptitude, and professional competency in specialized areas of Computer Science and Engineering.

2. Nature of the Honours Project

- The project shall be research-intensive, innovative, or product-oriented.
- It must be significantly distinct and more advanced than the regular B.Tech project.
- The project may involve:
    - Advanced algorithms and systems
    - Artificial Intelligence / Machine Learning
    - Data Science and Big Data Analytics
    - Cyber Security and Blockchain
    - Cloud Computing, DevOps, and Distributed Systems
    - IoT, Embedded Systems, or Interdisciplinary domains

3. Project Registration and Approval

- Students must submit a detailed project proposal including objectives, methodology, expected outcomes, and timeline.
- The proposal shall be reviewed and approved by the Department Committee.
- Any change in project title or scope requires prior approval.

4. Allocation of Project Guide

- Each Honours Project shall be supervised by a faculty member with relevant expertise.
- Co-supervision by an industry expert or research mentor may be permitted with approval.
- Students must meet the project guide regularly and comply with the guidance provided.

5. Work to Be Accomplished During the Semester

Students undertaking the Honours Project are expected to:

- Clearly define the research problem and objectives
- Perform an extensive literature review using reputed journals and conferences
- Design and validate the methodology / system architecture
- Implement advanced models, algorithms, or systems
- Perform experimentation, testing, and performance analysis
- Document findings systematically

6. Reviews and Progress Evaluation

- Periodic reviews shall be conducted by the Departmental Review Committee in hybrid mode**.**
- Students must present progress reports during each review.
- Evaluation will consider:
    - Depth of research and originality
    - Technical complexity and innovation
    - Quality of implementation and results
    - Documentation and presentation

7. Research Publication and Innovation

- Students are strongly encouraged to publish research papers arising from the Honours Project in reputed journals or conferences.
- Publications, patents, prototypes, or start-up outcomes aligned with the project will carry additional weightage, as per institute norms.

8. Documentation and Submission

Students must submit:

- Periodic progress reports
- A comprehensive Honours Project Report, including:
    - Abstract and introduction

- Literature survey
- Methodology and system design
- Experimental results and analysis
- Conclusion and future work

Source code, datasets, and supporting materials (where applicable)

9. Ethics, Originality, and Compliance

- The Honours Project must be originaland free from plagiarism.
- Proper citation of all references, datasets, and tools is mandatory.
- Ethical standards and data confidentiality must be strictly followed.

10. Evaluation and Certification

- The Honours Project shall be evaluated as per the Honours evaluation scheme approved by the Academic Council.
- Successful completion will lead to the award of the Honours degree/recognition as per regulations.

11. Expected Outcomes

By completing the Honours Project, students should:

- Demonstrate advanced technical and research skills
- Gain experience in independent problem-solving
- Be well-prepared for research careers, higher studies, or high-impact industry roles.

Note: Students are advised to plan the Honours Project carefully and maintain continuous interaction in hybrid mode with their project guide and review committee for successful completion.

Mapping of Course Outcomes with Program Outcomes

#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2								2	1	1	2		1	1
CO2	1									2		1	1		2
CO3			1		3							2	1	1	
CO4	1	1											2	1	
1 – High, 2 – Medium, 3 - Low															

Assessment Pattern

Level No.	Skill Level	ISE I	ESE
S1	Imitation	05	10
S2	Manipulation	10	10
S3	Precision	10	05
S4	Articulation	00	00

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55	Naturalization	00	00
Total Marks: 100		**50**	**50**

Level No.	Skill Level	ISE I	ESE
S1	Preparation	05	10
S2	Literature Review	05	10
S2	Observation and Analysis of Results	05	05
S3	Record	05	00
53	Honour Project / Presentation/ Viva-Voce	05	00
Total Marks: 100		**25**	**25**

Assessment table

Assessment Tool	S1	S2	S3	S4	S5
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	05	05	05	05	05
Practical Examination & Viva Voce (25 Marks)	10	10	05	00	00

Skill Level	ISE I	ESE
Imitation	10	10
Manipulation	20	10
Precision	20	10
Articulation	00	10
Naturalization	00	10

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