

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - AI & ML

COURSE MODULE FOR THE SESSION 2026-2027 (ODD SEM)

Course Syllabi with CO's

Faculty Name: Dr. Uma Mahesh R N				Academic Year: 2026 - 2027			
Department: Computer Science and Engineering (AI and ML)							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions 40hrs Theory + 8-10 lab slots
				L	T	P	
BCA701	Deep learning	IPCC	Machine Learning, Mathematics	3	-	2	
Course Learning Objectives	This course will enable students to: CLO 1. Understand the fundamentals of deep learning. CLO 2. Understanding the working of Convolutional Neural Networks and RNN in decision making. CLO 3. Illustrate the strength and weaknesses of many popular deep learning approaches. CLO 4. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.						
Topics Covered as per Syllabus							RBT
Module-1 Introduction: What is a Neural Network?, The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Feedback, Network Architectures, Rosenblatt's Perceptron: Introduction, Perceptron, The Perceptron Convergence Theorem, Relation Between the Perceptron and Bayes Classifier for a Gaussian Environment.							L1,L2,L3
Module-2 Multilayer Perceptrons: Introduction, Batch Learning and On-Line Learning, The Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back- Propagation Algorithm Perform Better, Back Propagation and Differentiation.							L1,L2,L3
Module-3 Regularization for Deep Learning: Parameter Norm Penalties - L2 Parameter Regularization, Dataset Augmentation, Semi-Supervised Learning. Optimization for Training Deep Models: Challenges in Neural Network Optimization – Ill Conditioning, Local Minima, Plateaus, Saddle Points and Other Flat Regions.							L1,L2,L3
Module-4 Convolution neural networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Convolutional Networks and the History of Deep Learning.							L1,L2,L3
Module-5 Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Long Short-Term Memory and Other Gated RNNs.							L1,L2,L3

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Practical Component of IPCC

1. Design and implement a neural based network for generating word embedding for words in a document corpus.
2. Write a program to demonstrate the working of a deep neural network for classification task.
3. Design and implement a Convolutional Neural Network (CNN) for classification of image dataset.
4. Build and demonstrate an autoencoder network using neural layers for data compression on image dataset.
5. Design and implement a deep learning network for classification of textual documents.
6. Design and implement a deep learning network for forecasting time series data.
7. Write a program to enable pre-train models to classify a given image dataset.
8. Write a program to read a dataset of text reviews. Classify the reviews as positive or negative.

List of Text Books

1. Simon Haykin, Neural networks and Learning Machines, Third Edition, Pearson, 2016
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.
https://www.deeplearningbook.org/lecture_slides.html

List of URLs, Text Books, Notes, Multimedia Content, etc

- <https://www.youtube.com/watch?v=VyWAvY2CF9c>
<https://www.youtube.com/watch?v=7sB052Pz0sQ>
https://www.youtube.com/watch?v=Mubj_fqiAv8
<https://www.coursera.org/learn/neural-networks-deep-learning>
https://onlinecourses.nptel.ac.in/noc20_cs62/preview

Course Outcomes (CO's)

At the end of the course the student will be able to:

- CO1 Analyze and interpret the concepts of neural networks relating to artificial intelligence.
- CO 2 Illustrate the learning processes and their statistical properties.
- CO 3 Design deep learning models using regularization and convolutional operations.
- CO 4 Analyze sequential data to build recurrent and recursive models.
- CO 5 Develop and analyze the applications using Autoencoders.

Assessment Details (both CIE and SEE)

Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.

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- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks. • 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and 10 marks for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC. CIE for the practical component of the IPCC
- 15 marks for the conduction of the experiment and preparation of laboratory record, and 10 marks for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (duration 02/03 hours) after completion of all the experiments shall be conducted for 50 marks and scaled down to 10 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC. SEE for IPCC Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours) 1. The question paper will have ten questions. Each question is set for 20 marks. 2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. 3. The students have to answer 5 full questions, selecting one full question from each module. 4. Marks scored by the student shall be proportionally scaled down to 50 Marks The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

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The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code:	BCA701		TITLE: Deep learning								
List of Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	3	2	3	2	3	-	-	-	-	-	2
CO-2	3	2	3	2	3	-	-	-	-	-	2
CO-3	3	2	3	2	3	-	-	-	-	-	2
CO-4	3	2	3	2	3	-	-	-	-	-	2
CO-5	3	2	3	2	3	-	-	-	-	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Subject Code:	BCA701	TITLE: Deep learning
List of Course Outcomes	Program Specific Outcomes	
	PSO1	PSO2
CO-1	-	3
CO-2	-	3
CO-3	-	3
CO-4	-	3
CO-5	-	3