KRISHNA UNIVERSITY

BOARD OF STUDIES (BoS) – DEPARTMENT OF COMPUTER SCIENCE

MINUTES OF THE BOARD OF STUDIES MEETING

Agenda:

To discuss and approve the proposed **curriculum, course structure and syllabus for I and II Semesters of the following PG programmes**:

- **Computer Applications**
- **Artificial Intelligence and Robotics**
- **Artificial Intelligence and Machine Learning**
- **Cybercrime and Cyber Security**
- **Data Analytics**

Members Present:

S. No.	Name	Designation	Role
1	Prof. R. Kiran Kumar	Dept. of Computer Science, Krishna University	Chairman
2	Smt. P. Durga Bhavani	HOD, Dept. of Computer Science, Nalanda Degree College, Vijayawada	Member
3	Kondapalli Ramkumar	HOD, Dept. of Electronics and Internet of Things, Nalanda Degree College, Vijayawada	Member
4	Bommareddy Sudheer Reddy	Lecturer, Dept. of Computer Science, Nalanda Degree College & PG Centre, Vijayawada	Member
5	Prof. P. Suresh Varma	Dept. of CSE, Adikavi Nannaya University, Rajahmundry	Member
6	Dr. M.H.M. Krishna Prasad	Dept. of CSE, JNTUK, Kakinada	Member
7	Prof. D. Lalitha Bhaskari	Dept. of CS & Systems Engineering, Andhra University	Member
8	Assoc. Prof. M. Babu Reddy	HOD, Dept. of Computer Science, Krishna University	Member

Proceedings

The meeting commenced with the Chairman welcoming all the members. The proposed curriculum and syllabi for the **I and II Semesters of the PG programmes** were placed before the Board for discussion and consideration.

The members discussed the proposed **course structure, syllabus , credits, teaching scheme, practical components, Course Outcomes and assessment pattern** of the above programmes. The members suggested that the curriculum should be practical, application-oriented and aligned with current technological and industry requirements.

Resolution

After detailed discussion, the **Board of Studies approved/recommended the proposed curriculum and syllabus for the I and II Semesters** of the following PG programmes:

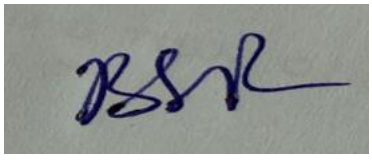
1. **Computer Applications**
2. **Artificial Intelligence and Robotics**
3. **Artificial Intelligence and Machine Learning**
4. **Cybercrime and Cyber Security**
5. **Data Analytics**

The Board recommended that the curriculum, syllabus, Course Outcomes, credits, teaching scheme and assessment pattern be finalized by incorporating the suggestions of the members and submitted to the competent academic authority for approval and implementation.

Conclusion

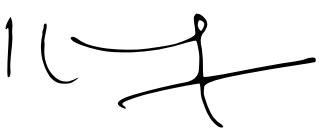
The Chairman thanked all the members for their valuable suggestions and active participation. The meeting concluded with a vote of thanks.











Model Syllabus for PG Diploma in Artificial Intelligence and Machine Learning

COURSE STRUCTURE (for Semester I & II)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Introduction to NLP	3	3
			Introduction to NLP Practical	2	1
	II	2	Deep Learning	3	3
			Deep Learning Practical	2	1

SEMESTER- I

COURSE 1 : INTRODUCTION TO NLP

Theory **Credits: 3** **3 hrs/week**

UNIT I: INTRODUCTION

Definition, History and evolution of NLP, Applications of NLP: Chatbots, Virtual Assistants, Machine Translation, Text Summarization, Question Answering, and Spam Detection, Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II: WORD LEVEL ANALYSIS

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III : SYNTACTIC ANALYSIS

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV : SEMANTICS AND PRAGMATICS

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V : DISCOURSE ANALYSIS AND LEXICAL RESOURCES

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution
Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural

Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python‖, First

Edition, O_Reilly Media, 2009.

REFERENCES

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.

2. Richard M Reese, —Natural Language Processing with Java‖, O_Reilly Media, 2015.

3. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.

4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval‖, Oxford University Press, 2008.

SEMESTER- 1

COURSE 1 : INTRODUCTION TO NLP

Practical **Credits: 1** **2 hrs/week**

Experiments List

1) Write a program in prolog to implement simple facts and Queries

2) Write a program in prolog to implement simple arithmetic

3) Write a program in prolog to solve Monkey banana problem

4) Write a program in prolog to solve Tower of Hanoi

5) Write a program in prolog to solve 8 Puzzle problems

6) Write a program in prolog to solve 4-Queens problem

7) Write a program in prolog to solve Traveling salesman problem PO5,P07

8) Write a program in prolog for Water jug problem List of Experiments (NLP)

1. Word Analysis 2. Word Generation 3. Morphology 4. N-Grams 5. N-Grams Smoothing

SEMESTER- II

COURSE 2: DEEP LEARNING

Theory **Credits: 3** **3 hrs/week**

UNIT I BASICS OF NEURAL NETWORKS

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

UNIT II INTRODUCTION TO DEEP LEARNING

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

UNIT III CONVOLUTIONAL NEURAL NETWORKS

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV MORE DEEP LEARNING ARCHITECTURES

LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Auto encoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V APPLICATIONS OF DEEP LEARNING

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

TEXT BOOK:

1. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.

REFERENCES:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
3. Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.
4. Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
5. Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016.

SEMESTER- II

COURSE 2: DEEP LEARNING

Practical	**Credits: 1**	**2 hrs/week**

List of Experiments

Week-1 : Perceptron Learning Implementation

Week-2 : Multilayer Perceptron and its Hyperparameter Tuning

Week-3 : Hyperparameter Tuning

Week-4 : Implementation of Multilayer Neural Network using Keras and Data Augmentation on MNIST dataset.

Week-5 : CNN Implementation on MNIST Dataset.

Week-6 : Transfer Learning of pretrained models on MNIST dataset

Week-7 : Transfer Learning on Plant Village dataset for Plant Disease Detection

Week-8 : Sentiment Analysis using Recurrent Neural Networks(RNN)

Week-9 : Text Generation using LSTM

Week-10 : Denoising and Dimensionality Reduction for Medical MNIST dataset using Autoencoders

KRISHNA UNIVERSITY

PG DIPLOMA Model Paper for Core Subjects

Semester :I

Paper Title : Introduction to NLP

Time : 3hrs **Max. Marks:70**

Section –A(20 Marks)

Answer any *Five* questions. All questions carry equal marks. 5X4=20M

1. Define NLP.
2. Explain Grammar-based LM
3. Explain rule-based PoS tagging
4. What is HMM ?
5. What is a Treebank?
6. What is syntactic parsing?
7. Define Word Sense Disambiguation
8. Explain the Brown Corpus.

Section–B (50Marks)

Answer ALL Questions. All questions carry equal marks. 5 X 10 = 50M

9. a) Explain the major applications of NLP

OR

b) Explain Regular Expressions and tokenization with suitable examples

10. a) Explain unsmoothed N-gram language model.

OR

B). Discuss the major issues and challenges involved in PoS tagging.

11. a) Explain Context-Free Grammars and grammar rules for English with suitable examples.

OR

b) Explain the probabilistic CYK parsing algorithm.

12. a) Discuss First-Order Logic in NLP.

OR

b) Explain bootstrapping methods for Word Sense Disambiguation.

13. a) Explain the Hobbs algorithm for anaphora resolution with a suitable example.

OR

b) Explain the Brown Corpus and British National Corpus .

KRISHNA UNIVERSITY

PG DIPLOMA Model Paper for Core Subjects

Semester :II

Paper Title : Deep Learning

Time : 3hrs **Max. Marks:70**

Section –A(20 Marks)

Answer any *Five* questions. All questions carry equal marks. 5X4=20M

1. Explain the basic concept of an Artificial neuron.
2. What is a perceptron?
3. What is dropout?
4. What is image classification?
5. Explain the advantages of transfer learning.
6. Define an Autoencoder.
7. What is DBM
8. What is opinion mining?

Section–B (50Marks)

Answer ALL Questions. All questions carry equal marks. 5 X 10 = 50M

9. a) Explain feed-forward neural networks with their architecture

OR

b) Explain the back-propagation algorithm in detail with suitable Example.

10. a) Explain ReLU and discuss its role in overcoming problems associated with activation functions.

OR

b) Explain Nesterov's Accelerated Gradient Descent in detail.

11. a) Explain the architecture and working of Convolutional Neural Networks in detail.

OR

b) Explain convolution and pooling operations with suitable examples.

12. a) Explain the architecture and working of LSTM networks in detail.

OR

b) Explain Variational Autoencoders (VAEs) in detail.

13. a) Explain image segmentation and object detection using deep learning

OR

b) Explain sentiment analysis using Recursive Neural Networks.