Course Code	PAD21D05T	Course Name	NATURAL LANGUAGE PROCESSING	Course Category	D	Discipline Specific Elective	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Data Science	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Teach students the leading trends and systems in natural language processing.
CLR-2 :	Make them understand the concepts of morphology, syntax, semantics and pragmatics of the language and that they are able to give the appropriate examples that will illustrate the above mentioned concepts.
CLR-3 :	Teach them to recognize the significance of pragmatics for natural language understanding.
CLR-4 :	Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.
CLR-5 :	To conceive basics of knowledge representation, inference, and relations to the artificial intelligence.
CLR-6	To understand natural language processing and to learn how to apply basic algorithms in this field

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		1	2	3	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	Understand approaches to syntax and semantics in NLP.																		
CLO-2 :	Understand approaches to discourse, generation, dialogue and summarization within NLP.	2	80	85	H	H	H	H	H	-	-	-	H	M	M	H	H	H	H
CLO-3 :	Understand current methods for statistical approaches to machine translation.	2	75	80	H	H	H	H	H	-	-	-	H	M	M	H	H	H	H
CLO-4 :	Understand machine learning techniques used in NLP, including the probabilistic context-free grammars and unsupervised methods, as applied within NLP	2	85	80	H	L	M	H	H	-	-	-	H	M	M	H	H	H	H
CLO-5 :	Understand the knowledge of various levels of analysis involved in NLP	2	80	75	H	H	H	H	H	-	-	-	H	M	M	H	H	H	H
CLO-6	Gain knowledge in automated Natural Language Generation and Machine Translation	2	75	85	H	H	H	H	H	-	-	-	H	M	M	H	H	H	H

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to NLP	Greedy	Introduction to CFG	Understanding Word Vectors	Information Extraction and its approaches
	SLO-2	Understanding Text	Non Greedy Regular Expressions	Intro to PCFG		
S-2	SLO-1	Text Encoding	POS Tagging	Markov Models	Introduction to LSA	Information Retrieval
	SLO-2	Tokenization	Types of POS tags	Hidden Markov Models		
S-3	SLO-1	Lemmatization	Named Entity Recognition	Data Labeling using NER	Implementation in Python	Semantic Search
	SLO-2	Stemming	Understanding NER			

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S-4	SLO-1	Vectorization	Semantic Roll Labeling	CRF	Word Embedding	Summarization
	SLO-2	Vectorization using TF	Understanding Text Parsing	CRF Implementation	Types of Word Embedding	Extractive Vs Abstractive
S-5	SLO-1	Vectorizatin using IDS	Various Algorithms used in Parsing	Extraction with LDA	Understanding Word to Vector Model	Information Fusion
	SLO-2	Count Vectorizer			Glove Embeddings	Single and Multi Document
S-6	SLO-1	Uses of NLP	NLTK Setup	NER	Difference between W to V &	Introduction to Chat pot Application
	SLO-2	Challenges of NLP		Standard Libraries	ELMO, Fasttext and Glove	
S-7	SLO-1	Terminologies of NLP	Components of NLP	POS Tagging	Understanding Machine Translation	Retrieval based and Conversation based NLU and NLG
	SLO-2	Steps of NLP				
S-8	SLO-1	Parsing Approach	Tokenization with NLTK	NLTK Implementation	Understanding Machine Translation	Introduction to Probabilistic Approaches
	SLO-2	Parsing types				
S-9	SLO-1	Corpus	Stop words using NLTK	Spacy Framework	Understanding LDA	Statistical Approaches to NLP tasks
	SLO-2	Corpus Linguistics		Text classification		
S-10	SLO-1	Regular Expressions	Stemming	Analysing and Processing text	Understanding LDA	Sequence Labeling
	SLO-2					
S-11	SLO-1	Regular Expressions in Python	Lemmatization	Using and Learning scikit	NER Application	Problems and Similarity Measures
	SLO-2					Sentence Embeddings
S-12	SLO-1	NLP Libraries	Synonyms and Antonyms with NLTK	Sentiment Analysis	Implementing NER application using Spacy	Recurrent Neural Networks
	SLO-2					

Learning Resources	1. Practical Natural Language Processing, By Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta and Harshit Surana, June 2020 2. Natural Language Processing with Python and spacy, uliVasiliev, April 2020.	3. C.Manning and H.Schutze, —Foundations of Statistical Natural Language Processingll, MIT Press. Cambridge,MA:,1999 4. Natural Language Processing with Python Quick Start Guide, NirantKasliwal, November 2018 5. YoavGoldberg,Neural Network Methods for Natural Language Processing.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice

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Level 1	Remember	40%	-	40%	-	40%	-	40%	-	40%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	20%	-	20%	-	20%	-	20%	-	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

 # CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
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