Course Type	Course Code	Name of course	L	T	P	Credit
DE	NCSD504	**Natural Language Processing**	3	0	0	3

Course Objective:
To familiarize the students with Fundamentals of Natural Language Processing
Learning Outcomes
• To familiarize the students with the fundamentals of Natural Language Processing so that they may start working on NLP applications. • Give them the necessary knowledge to develop techniques and systems to address real-time NLP problems and analyze the performance of NLP systems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction	2	Basic understanding of the need for NLP, its applications, and its relation to ML.
2	Machine Learning and Deep Learning basics: Logistic regression, SVM, HMM, CRF, ANN, RNN	8	Familiarize the students with the ML concepts necessary for NLP
3	Language Modelling, Morphology, Word Representation: Global and Contextual Representations.	5	Familiarize the students with an understanding of language models, morphology, and word representations.
4	Text classification, POS tagging, Named Entity Recognition	3	Familiarize the students with the idea of sequence modeling
5	Syntax Analysis: Statistical parsing, CYK algorithm, Constituency and Dependency parsing, Transition-based and Graph-based parsers.	4	Familiarize the students with the idea of natural language syntax analysis
6	Semantics: WSD, Semantic Role Labelling, Information Extraction, Coreference resolution and Entity linking	4	Familiarize the students with the idea of natural language semantic analysis
7	Machine translation: Statistical and Phrase-based translation, Neural MT, Encoder-decoder architecture, Attention mechanism	6	Familiarize the students with knowledge of machine translation
8	Transformer and Large Language Models: Self- attention, MLM (BERT), XLM, Training, and fine- tuning LLMs.	6	Familiarize the students with large language models.
9	Application: Question-answering, Summarization	4	Applications
Total		**42**	

Textbooks:

1. Speech and Language Processing - Dan Jurafsky and James H. Martin, Pearson Education India, 2013, ISBN 9789332518414
2. Introduction to Natural Language Processing -Jacob Eisenstein,The MIT Press, 2019, ISBN 978-0262042840

Reference books:

1. Foundations of Statistical Natural Language Processing -Chris ManningandHinrichSchütze,MIT Press. Cambridge, MA: May 1999, ISBN9780262133609