BCSE 0454: NATURAL LANGUAGE PROCESSING

Objective: *This course introduces the Natural Language Processing concepts – Text processing, Language Modelling, Parsing, Applications.*

Credits: 02 **Semester VI** **L–T–P: 2–0–0**

Module No.	Content	Hours
I	**Introduction:** Natural Language Understanding (NLU), Natural Language Processing (NLP), Natural Language Generation (NLG), Linguistic terminology- Morpheme, Grapheme, Phoneme, Classical Approaches of NLP, Understanding linguistics – Morphology, Syntax, Semantics, Pragmatics. Basics of Text processing, principles of text analysis: Regular Expression, word tokenization, Word normalization- Lemmatization and stemming, Stop words and Key words identification, Introduction to N-Gram models, Bag of Words Representation, PoS tagging **Language Modelling:** Introduction to Language modelling, Markov Models, Parts-of-speech Tagging: Hidden Markov Model, Viterbi Algorithm	15
II	**Semantic and Syntactic Processing:** Introduction to Semantics and Knowledge representation, Introduction to Grammar and Parsers: Top-down and bottom-up parser, Probabilistic Context Free Grammar, CKY Parsing Algorithm, Word Sense Disambiguity, Co-reference Resolution, Word embedding concept, Performance and correctness measures- Precision, Recall and F-Measure **Statistical Approaches:** Statistical parsing, Words & Vectors-Word2Vec concepts, TF-IDF computation, Inverted Index construction, Document Incidence Matrix construction, Text similarity methods—Similarity coefficient, Jaccard similarity, Cosine similarity. **Applications of NLP:** Information retrieval in NLP, Question Answering system, Opinion Mining, Sentiment analysis, Text classification, Document summarization Recommendation system, Machine Translation, Ontology construction and classification, Emerging Applications of Natural Language Generation.	15

Text Books:

- The handbook of Computational Linguistics and Natural Language Processing, " Alexandar Clark, Chris Fox and Shallom Lappin, Wiley.
- Handbook of NLP , Nitin Indurkhya, Fred J. Damerau, CRC Press

Reference Books:

- NLP with Python, Steven Bird, Ewan Klein, and Edward Loper, Oreilly
- Speech and Language Processing, Jurafsky, Daniel and James Martin, Prentice-Hall,

Outcome: Upon completion of this course, the students will be able to:

CO1: Apply basic concepts of Text processing
CO2: Apply the concept of Language modelling
CO3: Understand parsing techniques
CO4: Study and implementation of statistical approaches
CO5: Design and develop applications of NLP