Natural Language Processing – BTech Course Syllabus

📘 Course Objectives

- Understand linguistic phenomena and model them using formal grammars.
- Learn statistical and machine learning approaches to NLP.
- Design and evaluate NLP systems for real-world applications.

Unit I: Foundations of NLP

- Introduction to NLP and its applications
- Components of NLP: NLU vs NLG
- Morphology: Lexemes, Morphemes, Morphological Models
- Document structure analysis and complexity

Unit II: Syntax and Parsing

- Parsing techniques: Top-down, Bottom-up
- Treebanks and syntactic representations
- Parsing algorithms (e.g., CYK, Earley)
- Ambiguity resolution and multilingual issues

Unit III: Semantic Analysis

- Semantic parsing and interpretation
- Word sense disambiguation
- System paradigms and semantic software tools

Unit IV: Meaning Representation

- Predicate-argument structures
- Meaning representation systems (e.g., First-order logic, Frame semantics)
- Semantic role labeling

Unit V: Discourse and Language Modeling

- Discourse cohesion and reference resolution
- N-gram models and evaluation metrics
- Language model adaptation and multilingual modeling

Practical Components

- NLP programming using Python (NLTK, spaCy)
- Text preprocessing: Tokenization, POS tagging, Lemmatization
- Named Entity Recognition, Chunking
- Building and evaluating simple NLP pipelines

Recommended Textbooks

- *Speech and Language Processing* by Daniel Jurafsky & James H. Martin
- *Multilingual NLP Applications* by Daniel M. Bikel & Imed Zitouni