



# MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

## COURSE CONTENT

NATURAL LANGUAGE PROCESSING								
I Semester: CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2215815	Foundation	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisites: Data structures, finite automata and probability theory.								

### Course Overview:

This focuses on enabling computers to understand, interpret, and generate human language. This course introduces the fundamental concepts, techniques, and tools required to process and analyze text data using computational methods.

### Course Objectives:

1. To understand the fundamental concepts, challenges, and applications of Natural Language Processing (NLP).
2. To study linguistic structures, morphology, syntax, semantics, and discourse processing techniques used in NLP systems.
3. To learn parsing algorithms, statistical language models, and probabilistic approaches for natural language understanding.
4. To develop skills in designing and implementing NLP algorithms for text processing and information retrieval tasks.
5. To explore modern language modeling techniques and multilingual NLP applications for real-world problem solving.

### Course Outcomes: After Completion of the Course, Students should be able to

1. Implement morphological models and document analysis methods to identify word structures and document components..
2. Analyze the performance of various parsing algorithms and their effectiveness in ambiguity resolution across multiple languages.
3. Implement semantic parsing techniques and word sense disambiguation models to understand and represent the meaning of text..
4. Implement predicate-argument structure models to represent meaning in NLP systems.
5. Implement discourse processing models and language models like n-grams, and apply them to real-world NLP tasks.

### UNIT - I:

**Finding the Structure of Words:** Words and Their Components, Issues and Challenges, Morphological Models

**Finding the Structure of Documents:** Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

## **UNIT - II:**

**Syntax Analysis:** Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

## **UNIT-III:**

**Semantic Parsing:** Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

## **UNIT - IV:**

Predicate-Argument Structure, Meaning Representation Systems, Software.

## **UNIT - V:**

**Discourse Processing:** Cohesion, Reference Resolution, Discourse Cohesion and Structure  
**Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross Lingual Language Modeling

## **TEXT BOOKS:**

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

## **REFERENCE BOOKS:**

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

## **ELECTRONIC RESOURCES:**

1. <https://www.coursera.org/specializations/natural-language-processing>
2. <https://www.mygreatlearning.com/academy/learn-for-free/courses/introduction-to-natural-language-processing>
3. <https://alison.com/course/natural-language-processing-nlp>
4. <https://www.edx.org/learn/natural-language-processing>

## **MATERIALS ONLINE:**

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)