

Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Masters of Technology (M.Tech.) - Artificial Intelligence and Data Science
Course Code	:	2MAI02
Course Title	:	Natural Language Processing
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	
Course Objective	:	To understand the fundamentals of computer programming.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To teach students the leading trends and systems in natural language processing
	CO2	To understand the concepts of morphology, syntax, semantics and pragmatics of the language

### Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
			C	SEE	CIA	SEE	CIA	
3	0	0	3	70	30	30	20	150

Legends: **L**-Lecture; **T**-Tutorial/Teacher Guided Theory Practice; **P** - Practical, **C** - Credit, **SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

### Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	<b>INTRODUCTION TO NATURAL LANGUAGE PROCESSING:</b> Natural Language Processing: Introduction, why NLP, Stages in natural language Processing, Components of NLP, Application of NLP in Machine Translation, Information Retrieval and Big Data Information Retrieval	12	20%	CO1
2	<b>CLASSICAL APPROACHES TO NATURAL LANGUAGE PROCESSING:</b>	12	20%	

	Introduction NLG (natural language generation), formal language, linguistic and language processing, steps of NLP – Morphological and lexical analysis, lexical analysis, syntactic analysis, Semantic analysis, Discourse integration, Pragmatic analysis, terms related to linguistic analysis, grammatical structure of utterances, sentence, constituents, phrases, classifications and structural rules.				CO1 CO2
3	<b>COMPUTATIONAL FRAMEWORK</b> Framework such as LFG, GPSG, Panln, Partial Description of English or an Indian language in the Framework, Lexicon, Algorithms and Data Structures for Implementation of the Framework, Introduction to Semantics and Knowledge Representation	12	20%		CO2
4	<b>SYNTACTIC PROCESSING</b> Grammar, parser, Context-free grammar (CFG) – terminal, non-terminal, start symbols, how grammar works, regular expression, regular grammars, Parser, Parse tree, parsing, top-down parsing, bottom-up parsing, modelling a sentence using phase structure	12	20%		CO1 CO2
5	<b>SPEECH RECOGNITION, ALIGNMENT, STATISTICAL MACHINE TRANSLATION:</b> Modern Speech Recognition: Architectural Components, Historical Developments, Speech Recognition Applications, Technical Challenges and Future Research Directions, Alignment Basics, Sentence Alignment, Character, Word. Phrase Alignment, Statistical Machine Translation. Search Strategies, Research Areas, Some Applications, Tools: Matlab Programming, Tensor Flow.	12	20%		CO1 CO2

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
<b>Weightage</b>	20	30	30	20	0	0

*NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.*

### Suggested Learning Websites

Sr. No.	Name of Website
1	<a href="https://www.oracle.com/in/artificial-intelligence/what-is-natural-language-processing/#:~:text=Natural%20language%20processing%20(NLP)%20is,natural%20language%20text%20or%20voice.">https://www.oracle.com/in/artificial-intelligence/what-is-natural-language-processing/#:~:text=Natural%20language%20processing%20(NLP)%20is,natural%20language%20text%20or%20voice.</a>
2	<a href="https://www.ibm.com/topics/natural-language-processing">https://www.ibm.com/topics/natural-language-processing</a>
3	<a href="https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP">https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP</a>

### Reference Books

Sr. No.	Name of Reference Books
1	Daniel Jurafsky, James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2	Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with Python, 1 st ed., OReilly Media, 2009.
3	Nitin Indurkha and Fred J. Damerau, Handbook of Natural Language Processing, 2 nd ed., Chapman and Hall/CRC Press, 2010.
4	Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval Oxford University Press, 2008.