



# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY

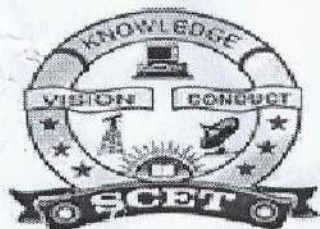
(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

### DEPARTMENT OF INFORMATION TECHNOLOGY

### TEACHING PLAN

| Course Code             | Course Title                                                                                                   | Semester   | Branch                                                 | Contact Periods /Week   | Academic Year | Date of commencement of Semester |
|-------------------------|----------------------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------|-------------------------|---------------|----------------------------------|
| 23IT6E04                | Natural Language Processing                                                                                    | VI         | IT                                                     | 6                       | 2025-2026     | 04-12-2025                       |
| COURSE OUTCOMES         |                                                                                                                |            |                                                        |                         |               |                                  |
| 1                       | Rephrase given text with basic Language features (K2)                                                          |            |                                                        |                         |               |                                  |
| 2                       | Build an innovative application using NLP components (K3)                                                      |            |                                                        |                         |               |                                  |
| 3                       | Apply a rule based system to tackle morphology/syntax of a language (K3)                                       |            |                                                        |                         |               |                                  |
| 4                       | Develop a tag set to be used for statistical processing for real-time applications (K3)                        |            |                                                        |                         |               |                                  |
| 5                       | Compare and contrast the use of different statistical approaches for different types of NLP applications. (K2) |            |                                                        |                         |               |                                  |
| UNIT                    | OutComes/<br>Bloom's Level                                                                                     | Topics No. | Topics/<br>Activity                                    | Text Book/<br>Reference | Contact Hour  | Delivery Method                  |
| I                       | CO – 1                                                                                                         |            | UNIT-1: INTRODUCTION                                   |                         |               | Chalk & Board                    |
|                         |                                                                                                                | 1.1        | Origins and challenges of NLP                          | T2                      | 1             |                                  |
|                         |                                                                                                                | 1.2        | Language Modeling                                      | T2                      | 1             |                                  |
|                         |                                                                                                                | 1.3        | Grammar-based LM                                       | T2                      | 1             | Power point presentation         |
|                         |                                                                                                                | 1.4        | Statistical LM                                         | T2                      | 1             |                                  |
|                         |                                                                                                                | 1.5        | Regular Expressions                                    | T2                      | 1             |                                  |
|                         |                                                                                                                | 1.6        | Finite-State Automata                                  | T2,T1                   | 1             |                                  |
|                         |                                                                                                                | 1.7        | English Morphology                                     | T2,T1                   | 1             |                                  |
|                         |                                                                                                                | 1.8        | Transducers for lexicon and rules                      | T2,T1                   | 1             | Assignment                       |
|                         |                                                                                                                | 1.9        | Tokenization                                           | T2,T1                   | 1             |                                  |
|                         |                                                                                                                | 1.10       | Detecting and Correcting Spelling Errors               | T2,T1                   | 1             |                                  |
|                         |                                                                                                                | 1.11       | Minimum Edit Distance                                  | T2                      | 1             | Test                             |
| Content beyond syllabus |                                                                                                                | 1.12       | Morphology - Inflectional<br>Morphology - Derivational | T2,T1                   | 1             |                                  |
| Total                   |                                                                                                                |            |                                                        |                         | 12            |                                  |
| II                      | CO – 2                                                                                                         |            | UNIT-II: WORD LEVEL ANALYSIS                           |                         |               | Chalk & Board                    |
|                         |                                                                                                                | 2.1        | Unsmoothed N-grams                                     | T1                      | 1             |                                  |
|                         |                                                                                                                | 2.2        | Evaluating N-grams                                     | T1                      | 1             |                                  |
|                         |                                                                                                                | 2.3        | Smoothing                                              | T1                      | 1             | Power point presentation         |
|                         |                                                                                                                | 2.4        | Interpolation and Backoff                              | T1                      | 1             |                                  |
|                         |                                                                                                                | 2.5        | Word Classes                                           | T1                      | 1             |                                  |
|                         |                                                                                                                | 2.6        | Part-of-Speech Tagging                                 | T1                      | 1             |                                  |
|                         |                                                                                                                | 2.7        | Rule-based                                             | T1                      | 1             |                                  |



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|                         |              |      |                                                            |       |           |                                 |
|-------------------------|--------------|------|------------------------------------------------------------|-------|-----------|---------------------------------|
|                         |              | 2.8  | Stochastic and Transformation-based tagging                | T1    | 1         | Assignment                      |
|                         |              | 2.9  | Issues in PoS tagging                                      | T1    | 1         |                                 |
|                         |              | 2.10 | Hidden Markov and Maximum Entropy models                   | T1    | 1         | Test                            |
| Content beyond syllabus |              | 2.11 | Unsmoothed N-grams                                         | T1    | 1         |                                 |
| <b>Total</b>            |              |      |                                                            |       | <b>11</b> |                                 |
| <b>III</b>              | <b>CO -3</b> |      | <b>UNIT-III: SYNTACTIC ANALYSIS</b>                        |       |           | <b>Chalk &amp; Board</b>        |
|                         |              | 3.1  | Context-Free Grammars                                      | T1,R1 | 1         |                                 |
|                         |              | 3.2  | Grammar rules for English                                  | T1    | 1         |                                 |
|                         |              | 3.3  | Treebanks                                                  | T1,R1 | 1         |                                 |
|                         |              | 3.4  | Normal Forms for grammar                                   | T1,R1 | 1         | <b>Power point presentation</b> |
|                         |              | 3.5  | Dependency Grammar                                         | T1,T2 | 1         |                                 |
|                         |              | 3.6  | Syntactic Parsing                                          | T1,T2 | 1         |                                 |
|                         |              | 3.7  | Ambiguity                                                  | T1,T2 | 1         |                                 |
|                         |              | 3.8  | Dynamic Programming parsing                                | T2    | 1         | <b>Assignment</b>               |
|                         |              | 3.9  | Shallow parsing                                            | T2    | 1         |                                 |
|                         |              | 3.10 | Probabilistic CFG                                          | T1    | 1         |                                 |
|                         |              | 3.11 | Probabilistic CYK                                          | T1    | 1         |                                 |
|                         |              | 3.12 | Probabilistic Lexicalized CFGs                             | T1    | 1         | <b>Test</b>                     |
|                         |              | 3.13 | Feature structures                                         | T1,R1 | 1         |                                 |
|                         |              | 3.14 | Unification of feature structures                          | T1,R1 | 1         |                                 |
| Content beyond syllabus |              | 3.15 | Transformation-Based Tagging                               |       | 1         |                                 |
| <b>Total</b>            |              |      |                                                            |       | <b>15</b> |                                 |
| <b>IV</b>               | <b>CO -4</b> |      | <b>UNIT-IV: SEMANTICS AND PRAGMATICS</b>                   |       |           | <b>Chalk &amp; Board</b>        |
|                         |              | 4.1  | Requirements for representation                            | T1    | 1         |                                 |
|                         |              | 4.2  | First-Order Logic                                          | T1    | 1         |                                 |
|                         |              | 4.3  | Description Logics                                         | T1    | 1         |                                 |
|                         |              | 4.4  | Syntax-Driven Semantic analysis                            | T1    | 1         | <b>Power point presentation</b> |
|                         |              | 4.5  | Semantic attachments                                       | T1    | 1         |                                 |
|                         |              | 4.6  | Word Senses                                                | T1,R1 | 1         |                                 |
|                         |              | 4.7  | Relations between Senses                                   | T1    | 1         |                                 |
|                         |              | 4.8  | Thematic Roles                                             | T1    | 1         | <b>Assignment</b>               |
|                         |              | 4.9  | selectional restrictions                                   | T1,R1 | 1         |                                 |
|                         |              | 4.10 | Word Sense Disambiguation                                  | T1    | 1         |                                 |
|                         |              | 4.11 | WSD using Supervised                                       | T1    | 1         |                                 |
|                         |              | 4.12 | Dictionary & Thesaurus                                     | T1    | 1         | <b>Test</b>                     |
|                         |              | 4.13 | Bootstrapping methods                                      | T1,R3 | 1         |                                 |
|                         |              | 4.14 | Word Similarity using Thesaurus and Distributional methods | T1    | 1         |                                 |
| Content beyond syllabus |              | 4.15 | Information Retrieval                                      | T1,R3 | 1         |                                 |
| <b>Total</b>            |              |      |                                                            |       | <b>15</b> |                                 |



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|                         |        |                   |                                                  |                                                         |       |               |                          |
|-------------------------|--------|-------------------|--------------------------------------------------|---------------------------------------------------------|-------|---------------|--------------------------|
| V                       | CO – 5 |                   | UNIT-V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES |                                                         |       | Chalk & Board |                          |
|                         |        | 5.1               | Discourse segmentation                           | T1,R1                                                   | 1     |               |                          |
|                         |        | 5.2               | Coherence                                        | T1,R1                                                   | 1     |               |                          |
|                         |        |                   | 5.3                                              | Reference Phenomena                                     | T1,R1 | 1             | Power point presentation |
|                         |        |                   | 5.4                                              | Anaphora Resolution using Hobbs and Centering Algorithm | T1,R1 | 1             |                          |
|                         |        |                   | 5.5                                              | Coreference Resolution                                  | T1,R1 | 1             |                          |
|                         |        |                   | 5.6                                              | Resources, Porter Stemmer                               | T1,R1 | 1             |                          |
|                         |        |                   | 5.7                                              | Lemmatizer                                              | T1,R2 | 1             |                          |
|                         |        |                   | 5.8                                              | Penn Treebank, Brill's Tagger                           | T1,R1 | 1             | Assignment               |
|                         |        |                   | 5.9                                              | WordNet, PropBank                                       | T1    | 1             |                          |
|                         |        |                   | 5.10                                             | FrameNet, Brown Corpus                                  | T1    | 1             |                          |
|                         |        |                   | 5.11                                             | British National Corpus (BNC)                           | T1    | 1             | Test                     |
| Content beyond syllabus | 5.12   | Transfer Metaphor | T1,R1                                            | 1                                                       |       |               |                          |

Total 12

CUMULATIVE PROPOSED PERIODS 65

### Text Books

| S.No. | AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION                                                                                                                                                                                |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition with Language Models, 3 <sup>rd</sup> edition, Pearson Publication, 2025. |
| 2     | Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python1, First Edition, O_Reilly Media, 2019.                                                                                                                   |

### Reference Books

| S.No. | AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION                                                                   |
|-------|--------------------------------------------------------------------------------------------------------------------------------|
| 1     | Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.                                 |
| 2     | Richard M Reese, —Natural Language Processing with Javal, O_Reilly Media, 2015                                                 |
| 3     | Nitin Indurkha and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010 |
| 4     | Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.          |

### Web Details

|   |                                                                                                                                                                                                                           |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <a href="https://ocw.mit.edu/courses/6-864-advanced-natural-language-processing-fall-2005/pages/lecture-notes/">https://ocw.mit.edu/courses/6-864-advanced-natural-language-processing-fall-2005/pages/lecture-notes/</a> |
| 2 | <a href="https://mrcet.com/downloads/digital_notes/CSE/III%20Year/CS/Natural%20Language%20Processing-1.pdf">https://mrcet.com/downloads/digital_notes/CSE/III%20Year/CS/Natural%20Language%20Processing-1.pdf</a>         |

|                            | Name           | Signature with Date    |
|----------------------------|----------------|------------------------|
| i. Faculty                 | Mr. K.Raja     | <i>K. Raja</i>         |
| ii. Module Coordinator     | Mr. K.Raja     | <i>K. Raja</i>         |
| iii. Programme Coordinator | Dr.RVVS Prasad | <i>Dr. RVVS Prasad</i> |

Principal