

Course Name Natural Language Processing**Course Code** CCS 412/CCT 418**Credit Units** 3**Pre-requisite** CCS 315 Intelligent Systems, CC 318 Introduction to expert systems**Purpose of the Course:** To briefly describe a fundamental technique for processing language for several subtasks, such as morphological analysis, syntactic parsing, word sense disambiguation**Expected Learning Outcomes:** On completion of this module the students shall be able to:

1. describe the architecture of and basic design for a generic NLP system `shell'
2. discuss the current and likely future performance of several NLP applications, such as machine translation and email response
3. briefly describe a fundamental technique for processing language for several subtasks, such as morphological analysis, syntactic parsing, word sense disambiguation.
4. understand how these techniques draw on and relate to other areas of (theoretical) computer science, such as formal language theory, formal semantics of programming languages, or theorem proving

Course Content

Computational models and methods for understanding written text. Introduction to syntactic analysis, semantic analysis, discourse analysis, knowledge structure and memory organization. A variety of approaches are covered, including conceptual dependency theory, connectionist methods and statistical techniques. Applications include story understanding, fact extraction and information retrieval. Lab Session: 3 hours per week

No	Topics to be covered in the course	Learning Objective of this topic	Expected Outcomes from Students	Teaching Method	Assessment Criteria	Deadlines and Homework
1	Ethics in NLP	Discussion of Course Overview ,objectives ,Importance of NLP, Job Market of NLP.	Students will be able to answer the Importance of NLP, Job Market of NLP.	Course Introductory Slide	Discussion in class	In class

2	Introduction to Natural language Processing	What is NLP , Stages of NLP , Application of NLP, Why NLP is Hard	Students will be able to Stages, Application of NLP	Lecture Slides	Discussion of AI and NLP	In class
3	Text Pre Processing	Regular Expression How Tokenization Works , Issues in tokenization, Morphology, Processing, stemming , Types of stemming, sentence splitting, chunking, Lemmatization	They will be in position to understand Text Pre Processing terminologies, how they work and what the issues were.	Book Topics	Demo in python Text Analytics using NLTK Assignment 1	Within a Week
4	Core NLP Technologies	Part of speech tagging, parsing (Syntactic Parsing and Context Free Grammar, Probabilistic Context Free Grammar, Dependency parsing)	They will be in a position to understand core NLP technologies, how they work and what the issues are.	Lecture slides	Demo in Python Building a simple parser using CFG Text Analytics using Spacy Assignment 2	Within a week
5	Information Extraction	Name Entity Recognition , Co-reference resolution, relation Extraction	Their understanding with various extraction techniques for information extraction.	Lecture Slide + Book Topics	Demo in Python using Spacy Quiz	In class
6	Introduction of Language Modeling	Probability view , N Gram , bigram , trigram Models of language modeling, perplexity, Interpolation, Smoothing ,	They will be able to learn the basics of Modeling Language.	Lecture Slide	Quiz	In class
7	Normalization in text	Document preprocessing, Feature encoding (BOW, TFIDF, Document vectors), Document similarity	They will be able to perform basic document normalization	Lecture slides + Reading material	Demo in python using Scikit Learn	Within a week

					Assignment 3	
8	Introduction to Machine Learning	Basic concepts of ML, Overview of ML models (Supervised and unsupervised)	They will be able to understand basic concepts of ML	Lecture slides + Book	Quiz	In class
9	Text Classification	Text classification, Model Evaluation, Creating a corpus, Corpus Annotation	They will be able to understand basic concepts of text classification and building a simple classifier	Lecture slides + Reading material	Demo in python using SciKit Learn Assignment 4	Within a week
10	Sentimental Analysis	Example Text classification problem, Sentimental analysis ,base line algorithm, sentimental lexicons	After this lecture, they are able to perform sentimental analysis using algorithm and classified with sentimental.	Lecture Slide + Book Topics	Project Option	Within two Week
11	Question Answering	What is QA ,Answer type and query formation ,passage retrieval, knowledge in QA, Architecture of QA	They will be able to do lot while resolving QA query formatting and Architecture designed for QA	Lecture Slide + Book Topics	Project Option	Within two Weeks

Mode of delivery: Lectures, directed reading, practical demonstrations of typical computing systems.

Course Assessment	Type	Weighting (%)
	Examination	70
	Continuous Assessment	30
	Total	100

References

1. "SPEECH and LANGUAGE PROCESSING: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition," Jurafsky and Martin, McGraw Hill, ISBN 9780131873216
2. "Speech and Language Processing Jurafsky," Daniel and James Martin, Prentice-Hall, ISBN 0131873210
3. "The Handbook of Computational Linguistics and Natural Language Processing," Alexander Clark, Chris Fox and Shalom Lappin, Wiley, ISBN 978-1118347188
4. "Natural Language Processing with Python," Steven Bird, Ewan Klein and Edward Loper, O'Reilly Media, ISBN 0596516495

helpful links

<https://towardsdatascience.com/gentle-start-to-natural-language-processing-using-python-6e46c07addf3>

<http://clt.gu.se/page/natural-language-processing-lecture-notes>