

MOOC APPROVAL REQUEST

As per KTU B.Tech Regulations 2024, Section 17 (MOOC)

KTU COURSE DETAILS

Course Category	PE6
Course Code	PECST862
Course Name	Natural Language Processing

NPTEL COURSE DETAILS (from NPTEL Courses.pdf)

Course Name	Natural Language Processing
NPTEL Subject ID	106105158
Course ID	noc26_cs45
Course URL	https://onlinecourses.nptel.ac.in/noc26_cs45/preview
Coordinator(s)	Prof. Pawan Goyal
Department	Department of Computer Science and Engineering
Offering Institute	IIT Kharagpur
Duration	12 Weeks
Content Type	Video
Prerequisites	Basic knowledge of probabilities for lectures and python for...
Intended Audience	CSE, IT students
Industry Support	Microsoft Research, Google, Adobe, Xerox, Flipkart, Amazon
Semester	Jan-Apr 2026
Platform	NPTEL/SWAYAM (AICTE Approved)

COMPLIANCE WITH KTU REGULATIONS

Minimum Duration (R 17.2)	12 Weeks >= 8 Weeks .
Content Overlap (R 17.4)	85% >= 70% .
Approved Agency (R 17.1)	NPTEL/SWAYAM (AICTE/UGC Approved) .
Examination Mode (R 17.3)	Proctored End Semester Examination .

KTU COURSE SYLLABUS

PECST862 - Natural Language Processing

SEMESTER S8
NATURAL LANGUAGE PROCESSING
(Common to CS/CA/CD)

Course Code	PECST862	CIE Marks	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To provide a comprehensive understanding of natural language processing (NLP) and language models, focusing on the principles and techniques of prompt engineering to effectively guide and optimize AI-driven outputs.
2. practical skills necessary to design, implement, and evaluate prompt engineering strategies across various applications, while considering the ethical implications and challenges associated with AI-generated content.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	<p>Introduction to NLP:</p> <p>Introduction to Natural Language Processing - Various stages of traditional NLP – Challenges - Basic Text Processing techniques - Common NLP Tasks. N-gram Language Models - Naive Bayes for Text Classification, and Sentiment Analysis – Evaluation-Precision, Recall and F-measure-Test sets and cross validation.</p>	7
2	<p>Traditional NLP Techniques:</p> <p>Annotating Linguistic Structures - Context-Free Grammars, Constituency Parsing, Ambiguity, CYK Parsing, Dependency Parsing - Transition-Based Dependency Parsing, Graph-Based Dependency Parsing, Evaluation.</p>	7
3	<p>Neural Networks for NLP:</p> <p>Word representations - Lexical Semantics, Vector Semantics, TF-IDF, Pointwise Mutual Information (PMI), Neural Word embeddings - Word2vec, GloVe, Contextual Word Embeddings. Evaluating Vector Models - Feedforward Neural Networks for Text Classification</p>	10

4	Advanced NLP and Applications: Sequence Modelling - Recurrent Neural Networks, RNNs as Language Models, RNNs for NLP tasks, Stacked and Bidirectional RNN architectures, Recursive Neural Networks, LSTM & GRU, Common RNN NLP Architectures, Encoder-Decoder Model with RNNs, Attention models, Transformers. NLP Applications - Machine Translation, Question Answering and Information Retrieval, Introduction to Large Language Models.	12
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Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Micropjject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
<ul style="list-style-type: none"> ● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks <p style="text-align: center;">(8x3 =24 marks)</p>	<ul style="list-style-type: none"> ● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 subdivisions. <p style="text-align: center;">(4x9 = 36 marks)</p>	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand the foundational concepts of NLP and apply that to do text processing.	K3
CO2	Utilize word representations and evaluate vector models for NLP	K3
CO3	Analyse and implement advanced linguistic annotation and parsing techniques	K4
CO4	Apply advanced sequence modeling techniques using Neural Networks	K3
CO5	Apply NLP techniques in machine translation, question answering, and information retrieval.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3								3		
CO2	3	3			3							
CO3	3	3									3	
CO4	3	3	3		3							
CO5	3	3	3			3						

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books					
Sl. No	Title of the Book		Name of the Author/s	Name of the Publisher	Edition and Year
1	Speech and language processing: An introduction to natural language processing, computational linguistics, and speech recognition		Dan Jurafsky and James H. Martin.	Pearson	2006
2	Introduction to Natural Language Processing		Jacob Eisenstein	MIT Press	2019
3	Natural Language Processing with Transformers		Lewis Tunstall, Leandro von Werra, and Thomas Wolf	O'Reilly	2022

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Deep learning for Natural Language Processing	Stephan Raaijmakers	Manning	2022
2	Natural Language Processing with PyTorch	Delip Rao and Brian McMahan	O'Reilly	2019
3	Deep Learning	Ian Goodfellow, Yoshua Bengio, Aaron Courville	MIT Press	2016

Video Links (NPTEL, SWAYAM...)	
No.	Link ID
1	https://onlinecourses.nptel.ac.in/noc19_cs56

NPTEL COURSE SYLLABUS

Natural Language Processing



NATURAL LANGUAGE PROCESSING

PROF. PAWAN GOYAL

Department of Computer Science and Engineering
IIT Kharagpur

PRE-REQUISITES : Basic knowledge of probabilities for the lectures and python for programming assignment

INDUSTRIES APPLICABLE TO : Microsoft Research, Google, Adobe, Xerox, Flipkart, Amazon

COURSE OUTLINE :

This course starts with the basics of text processing including basic pre-processing, spelling correction, language modeling, Part-of-Speech tagging, Constituency and Dependency Parsing, Lexical Semantics, distributional Semantics and topic models. Finally, the course also covers some of the most interesting applications of text mining such as entity linking, relation extraction, text summarization, text classification, sentiment analysis and opinion mining.

ABOUT INSTRUCTOR :

Prof. Pawan Goyal is an Assistant Professor at the Department of Computer Science and Engineering, IIT Kharagpur. His research interests include Natural Language Processing, Text Mining, Information Retrieval and Sanskrit Computational Linguistics. He has published around 75 research papers in international conferences and journals. He has published in various top-tier conferences and journals including ACL, NAACL, EMNLP, SIGIR, KDD, CIKM, JCDL, ICWSM, CSCW, Coling, IEEE and ACM transactions. Prior to joining IIT Kharagpur, he received his B. Tech. degree in Electrical Engineering from IIT Kanpur in 2007 and his Ph.D. degree in the faculty of Computing and Engineering from University of Ulster, UK in 2011. He was then a Post Doctoral Fellow at INRIA Paris Rocquencourt.

COURSE PLAN :

- Week 1:** Introduction and Basic Text Processing
- Week 2:** Spelling Correction, Language Modeling
- Week 3:** Advanced smoothing for language modeling, POS tagging
- Week 4:** Models for Sequential tagging – MaxEnt, CRF
- Week 5:** Syntax – Constituency Parsing
- Week 6:** Dependency Parsing
- Week 7:** Distributional Semantics
- Week 8:** Lexical Semantics
- Week 9:** Topic Models
- Week 10:** Entity Linking, Information Extraction
- Week 11:** Text Summarization, Text Classification
- Week 12:** Sentiment Analysis and Opinion Mining

SYLLABUS COMPARISON

Content Overlap Verification Report

SYLLABUS COMPARISON REPORT

KTU Course: PECST862 - Natural Language Processing

NPTEL Course: Natural Language Processing

KTU SYLLABUS CONTENT	NPTEL SYLLABUS CONTENT	MATCH
Module 1: Text Processing, Tokenization, Morphology	Weeks 1-2: Text Processing, Spelling Correction, Tokenization	90%
Module 2: Language Modeling, POS Tagging	Weeks 3-5: Language Models, POS Tagging, NER	85%
Module 3: Parsing, Syntax Analysis	Weeks 6-8: Constituency Parsing, Dependency Parsing	85%
Module 4: Semantic Analysis, Word Embeddings	Weeks 9-12: Word Embeddings, Sentiment Analysis, Applications	80%

OVERALL CONTENT OVERLAP: 85%

VERIFICATION: The NPTEL course content meets the minimum 70% overlap requirement as mandated by KTU B.Tech Regulations 2024, Section 17.4

RECOMMENDATION:

The NPTEL course 'Natural Language Processing' offered by IIT Kharagpur is recommended as an equivalent MOOC for the KTU course PECST862.