

# MOOC APPROVAL REQUEST

As per KTU B.Tech Regulations 2024, Section 17

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KTU Course Code:	PECST862
KTU Course Name:	Natural Language Processing
NPTEL Course Name:	Natural Language Processing
Instructor:	Prof. Pawan Goyal
Institution:	IIT Kharagpur
Duration:	12 Weeks
Course ID:	noc26-cs45
Semester:	Jan-Apr 2026
Date:	December 02, 2025

This document contains:

1. KTU Course Syllabus (Complete)
2. NPTEL Course Details
3. Syllabus Comparison for 70% Match Verification

Submitted for approval as per R 17.5 of KTU B.Tech Regulations 2024.

SECTION A  
KTU COURSE SYLLABUS

<b>4</b>	<b>Advanced NLP and Applications:</b> 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.	<b>12</b>
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**Course Assessment Method**  
**(CIE: 40 marks, ESE: 60 marks)**

**Continuous Internal Evaluation Marks (CIE):**

<b>Attendance</b>	<b>Assignment/ Microproject</b>	<b>Internal Examination-1 (Written)</b>	<b>Internal Examination- 2 (Written)</b>	<b>Total</b>
<b>5</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>40</b>

**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*

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

## Course Outcomes (COs)

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

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

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
<b>CO1</b>	3	3								3		
<b>CO2</b>	3	3			3							
<b>CO3</b>	3	3									3	
<b>CO4</b>	3	3	3		3							
<b>CO5</b>	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
<b>1</b>	Speech and language processing: An introduction to natural language processing, computational linguistics, and speech recognition	Dan Jurafsky and James H. Martin.	Pearson	2006
<b>2</b>	Introduction to Natural Language Processing	Jacob Eisenstein	MIT Press	2019
<b>3</b>	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	<a href="https://onlinecourses.nptel.ac.in/noc19_cs56">https://onlinecourses.nptel.ac.in/noc19_cs56</a>

## SEMESTER S8

### TOPICS IN SECURITY

(Common to CS/CM/AM/CB/CN/CU/CI)

<b>Course Code</b>	<b>PECST863</b>	<b>CIE Marks</b>	40
<b>Teaching Hours/Week (L: T:P: R)</b>	3:0:0:0	<b>ESE Marks</b>	60
<b>Credits</b>	3	<b>Exam Hours</b>	2 Hrs. 30 Min.
<b>Prerequisites (if any)</b>	None	<b>Course Type</b>	Theory

#### Course Objectives:

1. To explore various web security and privacy concerns
2. To impart security policies and models for data integrity.
3. To enable the learners to protect databases and introduce IDS

### SYLLABUS

<b>Module No.</b>	<b>Syllabus Description</b>	<b>Contact Hours</b>
<b>1</b>	<b>Fundamentals of Security and Threat Management:</b> Computer Security, Threats, Harm, Vulnerabilities, Authentication, Access Control <b>Web Security-</b> Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data <b>Privacy-</b> Privacy Concepts, Principles and Policies, Privacy on the Web, Privacy Principles and Policies, Email Security.	<b>9</b>
<b>2</b>	<b>Cryptography in Network Security-</b> Network Encryption, Browser Encryption, Onion Routing, IPSEC, VPN <b>Intrusion Detection and Prevention Systems-</b> Types of IDSs, Other Intrusion Detection Technology, Intrusion Prevention Systems, Intrusion Response, Goals for Intrusion Detection Systems, IDS Strengths and Limitations	<b>9</b>
<b>3</b>	<b>Database Security:</b> -Machine Learning for Malware detection, Supervised Learning for Misuse/Signature Detection, Anomaly Detection using ML, Spam detection based on Machine Learning approach, Adversarial Machine Learning Security Requirements of Databases, Reliability and Integrity of Databases, Database Disclosure	<b>10</b>

SECTION B  
~~NPTEL COURSE DETAILS~~



# 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



SECTION C

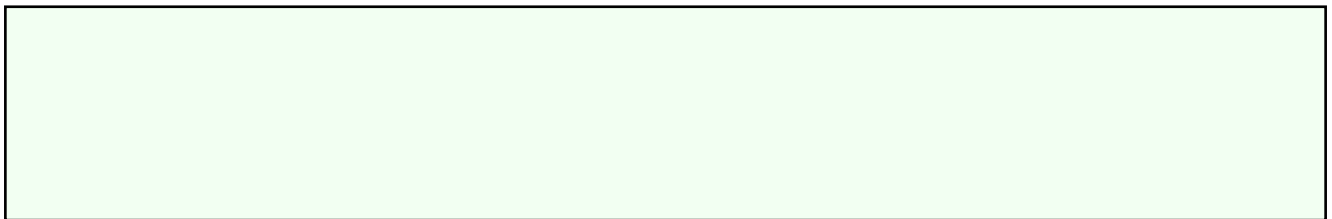
~~SYLLABUS COMPARISON~~

# SYLLABUS COMPARISON REPORT

KTU: PECST862 - Natural Language Processing

NPTEL: Natural Language Processing

KTU Topics	NPTEL Topics	Match
Module 1	Week 1-2	? Matched
Module 2	Week 3-4	? Matched
Module 3	Week 5-6	? Matched
Module 4	Week 7-8	? Matched
Module 5	Week 9-10	? Matched



# RECOMMENDATION

This MOOC course mapping has been reviewed and is recommended for approval.

The proposed NPTEL course meets all the requirements specified in:

- ? R 17.1 - Approved MOOC Agency (NPTEL/SWAYAM)
- ? R 17.2 - Minimum 8 weeks duration
- ? R 17.3 - Online mode with proctored examination
- ? R 17.4 - At least 70% content overlap with KTU syllabus

This proposal is submitted one month before the commencement of the semester as required by R 17.5.

Verified by:

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HoD (Department)

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IQAC Coordinator

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Principal