ABOUT THE COURSE

This is a comprehensive course designed to equip participants with the foundational knowledge, emerging trends and practical skills required to excel in the dynamic field of deep learning, LLMs, data science, time series and Geospatial analytics. Throughout the course, participants will delve into key concepts of DL, all while harnessing the power of Python programming language. With a blend of **theoretical instruction (15-hours) and hands-on exercises (15-hours)**, participants will develop proficiency in handling and analyzing large datasets, extracting valuable insights, and making data-driven decisions. This course provides an excellent starting point for mastering the essential tools and techniques used in the industry.

CONTENTS OF THE COURSE

1. Introduction to Deep Learning & LLM

- Mathematical Formulation of Artificial Neural Network, Differentiation and its Application in Optimization.
- Training Single Neuron Model and Training Multilayer Neural Network. Dropout and Regularization, Weight Initialization, Batch Normalization. Optimizers: Gradient Descent, Stochastic Gradient Descent, Nesterov Accelerated Gradient (NAG), Adaptive Gradient (AdaGrad), AdaDelta, RMSProp, ADAM, Choice between optimizers based on problem.
- Recurrent Neural Network, Encoder Decoder, Transformer, Attention Mechanism, Self-Attention, Multi-head Attention, LLM.
- Hands On: Implementation of DL models for Classification (MNIST), and Regression (AQI) Problems.

2. Introduction to Data Science and Transfer Learning

- Mathematical Preliminaries: Linear Algebra: Introduction to vectors, Vector operations, equation of a line, plane, hyperplane, circle, sphere, hypersphere, ellipse, ellipsoid.
- Probability and Statistics: Population & Sample, Gaussian Distribution and its PDF, CDF, Sampling Distribution and Central Limits Theorem.
- Exploratory data analysis: Summarizing Data and Plotting, Scatter plot, Pair plot, Histogram, PDF, CDF, Percentiles and Quantiles, Inter-Quartile Range (IQR), Box-plot, Violin plot, Data Science Process.
- CNN and Transfer Learning.
- Hands On: Data Preprocessing, Data Modeling, Image (Plant Disease, Skin Disease) Classification using CNN and Transfer Learning.

3. Crisp and Fuzzy Time Series Forecasting using DL

- Introduction to Time Series Forecasting (TSF), Method & Models, Crisp TSF using DL Models including LLMs, Additive, Multiplicative and Decomposition Based Hybrid models.
- Introduction to Fuzzy TSF, FTSF Ignoring Membership Values. FTSF considering Membership values (Traditional Fuzzy Set, Intuitonistic Fuzzy Set, Hesitatnt Fuzzy Set and Neutrosophic Fuzzy Set).
- Fuzzy Time Series Forecasting using LLM.
- Hands-on: Crisp and Fuzzy TSF (Crude Oil Price Forecasting, AQI, Gold Price, Stock Market Forecasting) using DL including LLMs.

4. Time Series Classification using DL including ViT

- Motivation and Introduction, Time Series Classification using Feature Based (Shapelets, ROCKET, MultiROCKET, MiniROCKET), Distance Based (Dynamic Time Warping, Euclidian), and Transformation based (Image: Gramian Angular Summation/ Difference fields, Recurrence Plots, Markov Transition fields) approaches.
- Hands-on: Time Series Classification (ECG, Human Activity Recognition, Earthquake Classification) using DL.

5. Geospatial Analytics using DL

- Introduction to Remote Sensing and Earth Observation, Applications of Remote Sensing and GIS, Electromagnetic Spectrum and Spectral Signatures, Spatial Spectral Temporal and Radiometric Resolution, Raster and Vector Data Models, Coordinate Reference Systems and Map Projections. Introduction and Data acquisition from Sentinel-1 and Sentinel-2 Satellites.
- Introduction to Google Earth Engine (GEE), Satellite Image Filtering by Date and Cloud Percentage, Multi-temporal Satellite Image Analysis.
- Hands-on: Post Disaster (Flood, Cyclone) Crop Damage Assessment using Satellite data and Google Earth Engine Code Editor.

COURSE OBJECTIVES

1. To familiarize the participants with the emerging topics of deep learning and data science.
2. To familiarize the participants with the emerging topics in crisp and fuzzy time series forecasting using DL and LLMs.
3. To familiarize the participants with emerging topics in Time Series Classification using DL.
4. To familiarize the participants with Remote Sensing fundamentals and equip them to analyze Satellite data using Google Earth Engine and DL for various real-world problems.

Short Term Course
on
Emerging Trends in Time Series and Geospatial Analytics using Deep Learning including LLMs
(ETTSGADL - 2026)

Hybrid Mode
(Online and Offline)
7th–11th DECEMBER 2026

Chairman
Prof. Pankaj Kumar Sa

Convener
Dr. Sibarama Panigrahi

Department of Computer Science and Engineering
National Institute of Technology
Rourkela-769 008, Odisha
http://www.nitrkl.ac.in

ABOUT NIT ROURKELA

National Institute of Technology (NIT) Rourkela is an institution of national importance funded by the Ministry of Education. NIT Rourkela was established as Regional Engineering College (REC) on August 15, 1961. In India, it was ranked 13 among engineering colleges by the National Institutional Ranking Framework (NIRF) in 2025. For details about the institute please visit us at www.nitrkl.ac.in.



ABOUT DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Department of Computer Science & Engineering, NIT, Rourkela was established in 1982. Since its inception, the Department is under dynamic progress and is able to establish the reputation for imparting quality education both at undergraduate and graduate programmes. The department also offers Ph. D. for regular as well as sponsored candidates. Please visit https://website.nitrkl.ac.in/CS/ to know more about the Department of CSE. The department has well equipped modern laboratories such as Software Engineering, Distributed Object Systems, Information Security & Data Communication, Image Processing & Cluster Computing and Advanced Database Engineering Labs for pursuing research keeping in view of the technological advancement.



TARGET PARTICIPANTS

The short-term course is of immense interest for UG/ PG students, research scholars/professionals, staff/ faculty members and industry professionals working in the area of Data Science, Deep Learning, Time Series Analytics, and Geospatial Analytics. The participants from different Science and Engineering (Computer Science and Engineering, Electronics and Communication Engineering, Electrical Engineering, etc.) background will be benefitted with this course.

IMPORTANT DATES

Registration Starts	4th November 2026
Registration Ends	30th November 2026
Maximum Offline Participants (First Come First Serve Basis)	60
Registration Confirmation	2nd December 2026
Course Schedule	7-11th December 2026

PREREQUISITES

1. The offline participants should bring their laptop.
2. Basics of python programming language and data structure will be a plus.

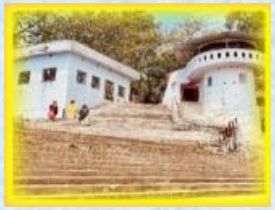
TOURIST PLACES NEARBY



Khandadhar Waterfall



Pitamahal Dam



Vedvyas Temple



Mandira Dam

REGISTRATION & FEE PARTICULARS

Registration Fee	
Students	Rs. 2,000/- (Online) Rs. 3000/- (Offline)
Faculty from Academic Institutions	Rs. 3500/-
Employees from Industry and R&D Organizations	Rs. 4,000/-
Accommodation Charges	
Guest house (South / North block)	As Per Institute Norms
Hostel	

Registration fees include Registration Kit, Refreshment, Tea and Snacks and 18% GST, 20% Institute Overhead, for Physical Participants. Lodging, boarding, lunch and dinner facility can be availed on separate payment basis and based on availability.

BANK ACCOUNT DETAILS FOR REGISTRATION

Account Name:	CONTINUING EDUCATION NIT ROURKELA
Account No.:	10138951784
Bank Name	State Bank of India(002109)
Branch:	NIT Rourkela Campus
IFSC Code	SBIN0002109

REGISTRATION FORM

To complete the online registration, the participants need to fill the following google form:

Click here for the Google Form Registration Link

Patron	Prof. K. Umamaheswar Rao, Director, NIT Rourkela
Chairperson	Prof. Pankaj K. Sa
Coordinator	Dr. Sibarama Panigrahi

Correspondence
Dr. Sibarama Panigrahi
Associate Professor & Convener, **ETTSGADL - 2026**
Department of Computer Science & Engg.
National Institute of Technology, Rourkela
Rourkela-769 008, Odisha, India
Phone: 07377302566(Mob)
E-mail: **panigrahis@nitrkl.ac.in**