

Time Series Forecasting & NLP Elective										
Day	Date	Track Name	Sub Track	Topics	Subtopics	Session 1	Session 2	Session 3	Session 4	TOOLS/CASE STUDY
1	27-01-2026	Time Series	Time Series Statistics	Time-dependent features, trend, seasonality, autocorrelation	ACF, PACF, stationarity testing	Introduction to Time Series Data, Overview of time series data. Components: trend, seasonality, noise.	Exploring Trend and Seasonality, Identifying trends and seasonal patterns. Decomposition of time series data.	Autocorrelation and Partial Autocorrelation Analysis, Autocorrelation: Measuring correlation of time series with lagged values. Partial Autocorrelation: Identifying direct relationships without indirect influence.	Stationarity Testing and Visualization, Testing for stationarity. Visualizing stationarity with plots (ACF, PACF).	Statsmodels, Pandas, Matplotlib, Seaborn, R (forecast package), Prophet, H2O.ai, Tableau
2	28-01-2026	Time Series	AR & MA Models	Autoregressive and Moving Average models	Lag selection, parameter tuning	Introduction to AR and MA Models, Overview of AR and MA models. Key differences between AR, MA, and ARMA.	Understanding AR and MA Processes, AR: Dependency on previous values., MA: Dependency on past errors.	Parameter Selection and Tuning, Choosing lag (p, q). Tuning with grid search.	Model Evaluation and Diagnostics, Residual analysis (ACF, PACF). Model evaluation (AIC, BIC).	Statsmodels, Scikit-learn, R (forecast package), Pandas, Matplotlib, Seaborn, H2O.ai.
3	29-01-2026	Time Series	ARMA & ARIMA Models	Combining AR and MA, differencing for stationarity	Model diagnostics, error metrics	ARMA Model Construction, Combining AR and MA models. Model structure: $AR(p) + MA(q)$.	ARIMA Model Introduction and Difference Techniques, ARIMA: AR, MA, and differencing. Differencing for stationarity.	Stationarity Through Differencing, Removing trends with differencing. Identifying the order of differencing (d).	ARIMA Model Diagnostics and Evaluation, Residual analysis for ARIMA. Model evaluation with AIC, BIC, and forecast accuracy.	Statsmodels, Scikit-learn, R (forecast package), Pandas, Matplotlib, Seaborn, H2O.ai.
4	30-01-2026	Time Series	SARIMA & SARIMAX	Seasonal components, exogenous variables	SARIMA, SARIMAX models, forecasting	Seasonal Patterns in SARIMA Models, Capturing seasonal trends with SARIMA. Seasonal differencing and seasonal parameters.	Exogenous Variables in SARIMAX, Adding external variables (X) in SARIMAX. Impact of exogenous variables on forecasting.	Parameter Selection for SARIMA & SARIMAX, Choosing seasonal and non-seasonal parameters. Grid search for optimal parameters (p, d, q, P, D, Q).	SARIMAX Forecasting and Validation, Forecasting with SARIMAX model. Model validation using residual analysis and accuracy metrics.	Statsmodels, Scikit-learn, R (forecast package), H2O.ai, Pandas, Matplotlib, Seaborn.
5	31-01-2026	NLP	Text Processing	Tokenization, stop word removal, stemming, lemmatization	Part-of-speech tagging	Introduction to NLP, Overview and key applications (text classification, sentiment analysis).	Tokenization and Stop Word Removal-Splitting text into tokens, removing common words.	Lemmatization and Stemming Techniques-Lemmatization: Base form, Stemming: Root form.	Part-of-Speech Tagging and Entity Recognition - POS tagging: Identifying word types, NER: Extracting entities.	NLTK, SpaCy, Gensim, Scikit-learn, TextBlob, Hugging Face Transformers, Stanford NLP, Pattern.
6	02-02-2026	NLP	Text Cleaning & Annotation	Removing noise, entity recognition, labelling strategies	Data annotation strategies	Text Cleaning Fundamentals - Removing noise, special characters, and handling missing data.	Entity Recognition with spaCy - Using spaCy for Named Entity Recognition (NER).	Annotation and Labeling Techniques - Manual and automated data labeling.	Noise Removal and Text Pre-processing - Removing stop words, punctuation, and tokenization.	SpaCy, NLTK, TextBlob, Hugging Face Transformers, Pandas, Prodigy, Labelbox, RapidMiner.
7	03-02-2026	NLP	Rule-Based NLP	Pattern matching with spaCy, custom rules	Phrase matching, entity ruler	Introduction to Rule-Based NLP - Overview of rule-based methods in NLP. Applications: Text extraction, information retrieval.	Rule Creation and Pattern Matching - Defining rules and matching patterns in text.	Phrase Matching and Entity Ruler - Matching specific phrases and entities using spaCy's Entity Ruler.	Customizing spaCy for Rule-Based Matching - Customizing spaCy pipeline for specific rule-based matching tasks	SpaCy, NLTK, Regex, Hugging Face Transformers, Prodigy, Pattern, RapidMiner.
8	04-02-2026	NLP	Text Classification	Binary, multi-class, multi-label classification	Evaluation metrics, confusion matrix	Introduction to Text Vectorization - Converting text to numerical format (e.g., TF-IDF, Word2Vec)	Binary Text Classification Models - Classifying text into two categories (e.g., spam vs. non-spam).	Multi-Class and Multi-Label Classification - Multi-class: Assigning one category to each text. Multi-label: Assigning multiple categories to each text.	Confusion Matrix and Model Evaluation - Evaluating model performance using confusion matrix (accuracy, precision, recall, F1-score).	Scikit-learn, NLTK, SpaCy, Hugging Face Transformers, Gensim, XGBoost, LightGBM, TensorFlow, Keras, RapidMiner.
9	05-02-2026	NLP & GenAI	Advanced Classification Models	fastText, advanced classification techniques	Model training and tuning	Introduction to fastText for Classification - Overview of fastText for text classification. Benefits: Speed and efficiency in training.	Training Classifiers Using fastText - Training models with labeled data using fastText. Steps: Data preparation, model training.	Model Tuning and Evaluation - Hyperparameter tuning for optimal performance. Evaluating model using accuracy, precision, recall.	Advanced Classification with GenAI Integration - Enhancing classification models with GenAI tools. Integrating fastText with GenAI for improved results.	fastText, Hugging Face Transformers, Scikit-learn, TensorFlow, Keras, XGBoost, LightGBM, H2O.ai, Google Cloud AutoML.
10	06-02-2026	Time Series & NLP	GenAI for Forecasting & NLP	Apply GenAI for forecasting and text preprocessing	Automating predictions and insights extraction	GenAI Tools Overview for Time Series Forecasting - Overview of GenAI tools for time series analysis. Applying GenAI for forecasting accuracy improvements.	Using GenAI for NLP and Text Cleaning - Leveraging GenAI for text preprocessing. Automating text cleaning with GenAI.	Enhancing Model Predictions with GenAI - Using GenAI to improve model accuracy and predictions. Fine-tuning models with GenAI Integration.	Final Project Integration: Time Series + NLP Automation - Combining time series forecasting and NLP with GenAI. End-to-end automation for forecasting and text analysis.	Google Cloud AutoML, H2O.ai, DataRobot, TensorFlow, Hugging Face Transformers, MLflow, Amazon SageMaker, RapidMiner.
11	07-02-2026	REVISION								
12	09-02-2026	FINAL END SEMESTER EXAMINATION								