MERCURY

Time Series Forecasting Training Course

21 – 25 June 2027
Barcelona (Spain)



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Ref: 16027_1080005 **Date:** 21 – 25 June 2027 **Location:** Barcelona (Spain) **Fees:** 5600 Euro

Introduction to Time Series Forecasting Training Course:

The Time Series Forecasting training course equips professionals with the analytical and technical expertise to model, predict, and interpret time-dependent data. It provides in-depth knowledge of forecasting models, from classical statistical methods to cutting-edge machine learning techniques. Learners will explore how to analyze trends, seasonality, and irregular fluctuations to forecast key variables in business and finance.

Through hands-on training and real-world projects, participants will gain proficiency in using tools such as Python, R, and Excel for time series modeling. The Time Series Forecasting program emphasizes practical application, enabling learners to derive actionable insights and optimize business performance. It covers challenges such as data irregularity, model evaluation, and uncertainty in forecasting outcomes.

This Time Series Forecasting course helps professionals enhance their financial planning, resource allocation, and demand forecasting skills. By integrating technical skills with strategic thinking, learners can make informed, data-driven decisions. Whether for beginner analysts or seasoned data scientists, this Time Series Forecasting certification course ensures skill advancement and business impact.

Targeted Groups:

This Time Series Forecasting training course targets professionals seeking specialized knowledge and skills:

- Business analysts are aiming to enhance data-driven strategies.
- Financial analysts seek to predict market movements.
- Data scientists focus on predictive modeling.
- Machine learning engineers work with time series datasets.
- Economists are conducting macroeconomic modeling.
- Statisticians specializing in temporal data analysis.
- Market researchers analyze sales and consumer patterns.
- Supply chain and logistics managers forecast demand.
- Academic researchers deal with time-based studies.
- Professionals in the banking, energy, healthcare, and insurance sectors need forecasting skills.

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Course Objectives:

Participants will achieve the following objectives by completing the Time Series Forecasting course:

- Understand the core structure and components of time series data.
- Analyze historical data to detect patterns, seasonality, and trends.
- Build and apply statistical models such as ARIMA and Exponential Smoothing.
- Integrate advanced forecasting techniques using machine learning algorithms.
- Conduct preprocessing of data, manage anomalies, and handle gaps.
- Evaluate forecast performance using industry-standard metrics.
- Interpret model outputs to guide strategic business actions.
- Utilize multivariate modeling and consider external factors when forecasting.
- Present forecasting insights to support stakeholder decisions.
- Design and implement forecasting solutions aligned with organizational goals.
- Apply forecasting techniques in real-world scenarios for various industries.
- Utilize automation tools for scalable forecasting solutions.
- Compare and choose the best models based on data behavior and accuracy.
- Optimize business processes and resource planning using predictive analytics to drive informed decision-making.
- Develop confidence intervals and quantify uncertainty in forecasting.

Targeted Competencies:

Participants will gain the following competencies during the Time Series Forecasting Program:

- Proficiency in collecting, cleaning, and preparing time series datasets.
- Skill in choosing the appropriate forecasting technique for different contexts.
- Ability to assess model reliability and predictive performance.
- Expertise in statistical and machine learning forecasting tools.
- Confidence in managing assumptions and limitations of models.
- Competence in using forecasts to support strategic and financial decisions.
- Insight into mitigating risks and adapting to forecast variability.
- Understanding of visualizing and communicating forecast results effectively.

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Course Content:

Unit 1: Fundamentals of Time Series Analysis and Forecasting:

- Introduction to time series data: structure, significance, and use cases.
- Key components of time series: trend, seasonal, cyclical, and irregular elements.
- Identifying the business value of time series forecasting and analysis.
- Distinguishing between univariate and multivariate time series data.
- Techniques for time series data collection and preparation.
- Exploratory data analysis EDA and pattern recognition in time series.
- Visualizing data to reveal structure and anomalies.
- Time Series Decomposition Techniques: Additive and Multiplicative Models.
- Using autocorrelation ACF and partial autocorrelation PACF to identify lags.
- Understanding lag plots and correlograms.
- Common problems in time series forecasting missing values, outliers.
- Overview of forecasting applications across industries.

Unit 2: Classical Forecasting Models and Statistical Techniques:

- Moving averages and exponential smoothing: simple, double, and Holt-Winters methods.
- Deep exploration of AR, MA, ARMA, and ARIMA models.
- Seasonal ARIMA SARIMA modeling for complex time series.
- Stationarity: concept, detection, and transformation techniques.
- Differencing methods to stabilize time series data.
- Estimating and selecting model parameters using AIC/BIC criteria.
- Residual diagnostics and white noise validation.
- Forecasting horizon and model performance under different conditions.
- Using Box-Jenkins methodology for ARIMA modeling.
- Application of statistical software e.g., R and Python in classical modeling.
- Case studies: financial market forecasting and retail sales prediction.
- Exercises in modeling and validating classical time series models.

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Unit 3: Advanced Forecasting Models and Machine Learning Applications:

- Introduction to machine learning in time series forecasting.
- Regression techniques for univariate and multivariate time series.
- Feature engineering and lag variable creation.
- Deep Learning for Sequence Data: RNNs, GRUs, and LSTM Architectures.
- Comparing machine learning and classical statistical models.
- Integration of external variables weather, events in multivariate models.
- Model training, tuning, and validation techniques e.g., cross-validation.
- Handling high-dimensional and large-scale time series datasets.
- Practical forecasting projects using Python and scikit-learn.
- Implementing pipelines for real-time prediction and monitoring.
- Applications include demand forecasting, pricing optimization, and anomaly detection.
- Real-world projects using machine learning in business operations.

Unit 4: Forecast Evaluation, Risk Management, and Optimization:

- Forecast accuracy metrics: RMSE, MAE, MAPE, and Theil's U.
- Interpreting performance metrics and improving model quality.
- Confidence intervals and prediction bands in time series forecasts.
- Business scenario testing using sensitivity and what-if analysis.
- Integrating forecasts into budgeting and planning frameworks.
- Identifying risks and uncertainty in predictive models.
- Applying forecasts in strategic decisions and risk mitigation.
- Demand forecasting for inventory and logistics optimization.
- Forecasting under volatility: tools for unstable or high-variance data.
- Optimization techniques using forecast data in business decisions.
- Using simulation models for complex forecasting challenges.
- Case studies: risk-aware forecasting in energy and healthcare.

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Unit 5: Practical Applications, Software Tools, and Industry Case Studies:

- Working with forecasting tools: Python Prophet, Statsmodels, R, Excel.
- Automating forecasting processes using scripts and dashboards.
- Best practices for reproducible forecasting workflows.
- Building forecasting dashboards with interactive visualizations.
- Industry-specific forecasting challenges and success stories.
- Case study: demand forecasting in retail and e-commerce.
- Case study: revenue forecasting in financial institutions.
- Case study: energy consumption forecasting and grid planning.
- Ethical concerns in AI-driven forecasting bias, fairness, transparency.
- Data privacy and compliance in time series forecasting applications.
- Final project: build, present, and justify a comprehensive forecasting model.
- Forecasting trends: generative AI, hybrid modeling, and automation.

Final Insights & Key Takeaways:

The Time Series Forecasting training course equips professionals to model and forecast data with accuracy and confidence. Through practical projects and real-world tools, participants develop skills that inform business strategy and drive informed decision-making. With an emphasis on both classical and machine learning techniques, learners will handle a wide range of forecasting challenges. This course supports cross-industry applications, spanning finance, energy, and supply chain management. Participants will be able to build robust, insightful, and actionable forecasting solutions.