Advanced Time Series Econometrics with R/Python Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today's data-driven economy, mastering advanced time series econometrics is a game-changer for professionals in finance, data science, economics, and beyond. Advanced Time Series Econometrics with R/Python Training Course is designed to equip learners with practical and cutting-edge skills to analyze, forecast, and interpret complex temporal data using R and Python. With the global rise of big data and real-time analytics, time series modeling, volatility forecasting, and causal inference techniques have become essential tools for informed decision-making across industries.

This course bridges rigorous theoretical econometrics with hands-on applications in R and Python, empowering participants to build dynamic models, apply high-frequency forecasting techniques, and solve real-world problems. From ARIMA and GARCH models to state-space frameworks and machine learning-based forecasting, learners will gain valuable insights and tools to lead data analytics projects in finance, academia, central banking, policy analysis, and technology sectors.

Programme Curriculum

Advanced Time Series Econometrics with R/Python Training Course

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valuable insights and tools to lead data analytics projects in finance, academia, central banking, policy analysis, and technology sectors.

Course Objectives

1. Master advanced time series modeling techniques using R and Python.
2. Understand and apply ARIMA, SARIMA, and exponential smoothing models.
3. Conduct volatility modeling using ARCH/GARCH and its extensions.
4. Implement unit root and stationarity tests in real datasets.
5. Explore vector autoregression (VAR) and vector error correction models (VECM).
6. Apply state-space models and Kalman filters in forecasting.
7. Leverage machine learning algorithms for time series prediction.
8. Perform seasonality and trend decomposition using STL/ETS models.
9. Analyze financial time series including high-frequency data.
10. Utilize Bayesian techniques for time series inference.
11. Conduct causality tests (Granger, Toda-Yamamoto) for policy analysis.
12. Visualize and interpret time series outputs for stakeholder reporting.
13. Build real-time dashboards for time series applications.

Target Audiences

1. Financial analysts and investment professionals
2. Economists and policy researchers
3. Data scientists and machine learning engineers
4. Statisticians and quantitative analysts
5. Academicians and graduate students in economics or finance
6. Central bank and regulatory staff
7. Business intelligence professionals
8. Professionals in fintech, trading, and risk management

Course Duration: 5 days

Course Modules

Module 1: Introduction to Time Series Econometrics

- Overview of time series data structures
- Autocorrelation and partial autocorrelation
- Stationarity, trend, and seasonality
- ACF/PACF interpretation with R and Python
- Introduction to ARIMA models
- **Case Study:** GDP forecasting using historical data

Module 2: Advanced ARIMA and Seasonal Modeling

- ARIMA vs SARIMA modeling
- Model identification and diagnostics
- Automated forecasting using auto.arima and pmdarima
- Cross-validation for time series models
- Model comparison with AIC/BIC metrics
- **Case Study:** Sales forecasting for a retail business

Module 3: Volatility Modeling with ARCH/GARCH

- ARCH and GARCH theory and assumptions

- Extensions: GJR-GARCH, EGARCH, TGARCH
- Volatility clustering in financial time series
- Implementation in rugarch and arch libraries
- Risk metrics: VaR and conditional volatility
- **Case Study:** Stock market volatility modeling

Module 4: Multivariate Time Series: VAR and VECM

- Vector autoregression (VAR) model structure
- Johansen cointegration test and VECM modeling
- Impulse response functions and variance decomposition
- Lag length selection and stationarity diagnostics
- Forecasting with multivariate systems
- **Case Study:** Exchange rate and interest rate analysis

Module 5: State-Space Models and Kalman Filter

- Introduction to state-space frameworks
- Filtering and smoothing techniques
- Application of Kalman filter in dynamic systems
- Time-varying parameter models
- Implementation in dlm and pydlm packages
- **Case Study:** Inflation modeling with time-varying coefficients

Module 6: Machine Learning for Time Series

- Feature engineering for time series
- LSTM, XGBoost, and Prophet models
- Forecast accuracy and cross-validation
- Hyperparameter tuning and model selection
- Ensemble models for improved prediction
- **Case Study:** Energy demand forecasting using ML

Module 7: Causal Inference and Structural Analysis

- Granger causality and impulse response
- Structural VARs and restrictions
- Difference-in-differences (DiD) for time series
- Local projection methods
- Application in policy evaluation
- **Case Study:** Fiscal policy impact on GDP

Module 8: Time Series Visualization and Dashboarding

- Data visualization tools for time series
- Interactive dashboards in Shiny and Dash
- Real-time updating charts
- Communicating forecasts to stakeholders
- Exporting plots and reports
- **Case Study:** Real-time COVID-19 tracking dashboard

Training Methodology

- Hands-on coding sessions with R and Python
- Real-world case studies and datasets
- Group-based exercises and peer review

- Live project development and feedback
- Post-training assignments and certificate
- Access to all scripts, templates, and recordings

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com