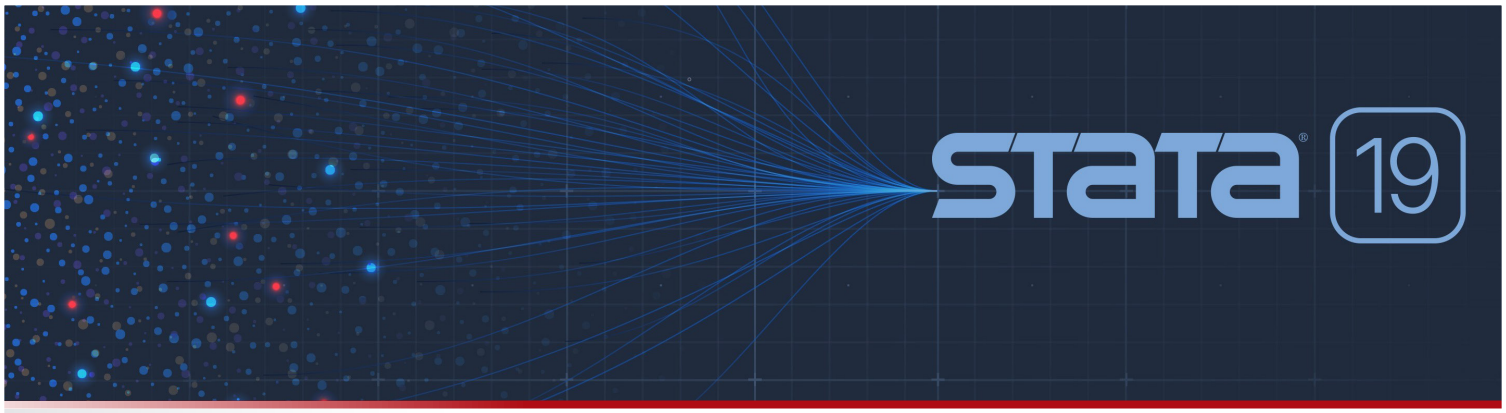

TStat

TRAINING COURSE | ONLINE

SPATIAL CROSS-SECTIONAL ECONOMETRICS USING STATA

2-3, 5-6 November 2026

Spatial dependence and spatial heterogeneity characterize many economic and social phenomena, including regional growth, innovation, labor markets, migration, electoral dynamics, public health, and environmental processes. Traditional econometric techniques often fail to account for these spatial interactions, leading to biased estimates and misleading inference.

This course provides a comprehensive introduction to modern spatial econometric methods for cross-sectional data, with a strong emphasis on empirical implementation using the statistical software *Stata*. Participants will learn how to manage and visualize spatial data, construct and normalize spatial weights matrices, test for spatial autocorrelation, estimate spatial regression models, and interpret direct and indirect spillover effects.

In common with TStat's course philosophy, each session is composed of both a theoretical component, in which the techniques are fully explained through a series of course-specific examples, and an applied, hands-on segment, during which participants implement the techniques on real-world datasets under the guidance of the course tutor.

This is Module One of the two-part Spatial Econometrics using *Stata* training pathway. It is fully self-contained, but can be taken on its own, whilst also providing the natural foundation for Block Two, dedicated to spatial panel data econometrics.

By the end of the course participants will be able to:

- understand the main sources of spatial dependence and spatial heterogeneity;
- manage and prepare spatial datasets in *Stata*;
- construct, row-standardize and normalize spatial weights matrices;
- detect and interpret spatial autocorrelation;
- estimate and interpret cross-sectional spatial regression models (SAR, SEM and SDM);
- evaluate direct, indirect and total spatial effects;
- perform specification testing and model selection;
- implement applied spatial econometric analyses independently.

TARGET AUDIENCE

The course is designed for:

- Ph.D. students;
- researchers in economics, regional science, geography, political science and related disciplines;
- analysts working in public institutions, central banks, policy agencies and international organizations;
- professionals interested in applied spatial data analysis.

COURSE CODE

D-EF-34

PREREQUISITES

Participants are expected to have:

- basic knowledge of econometrics;
- familiarity with linear regression;
- introductory knowledge of maximum likelihood estimation;
- working knowledge of *Stata* and do-file programming.

Prior exposure to spatial analysis is not required.

PROGRAM

SESSION I: INTRODUCTION TO SPATIAL DATA ANALYSIS

1. Why space matters in economics and social sciences
2. Spatial dependence and spatial heterogeneity
3. Types of spatial data:
   - point data;
   - areal data;
   - spatial interaction data;
   - geostatistical data.
4. Consequences of ignoring spatial effects
5. Introduction to spatial econometrics
6. Overview of *Stata*'s spatial framework

Practical Session in Stata

1. Spatial data declaration
2. Importing shapefiles
3. Spatial datasets preparation
4. Introduction to spset
5. Managing spatial objects in *Stata*

SESSION II: SPATIAL VISUALIZATION AND SPATIAL WEIGHTS

1. Spatial visualization techniques
2. Coordinate systems and projections
3. Spatial proximity concepts
4. Contiguity matrices
5. Distance-based matrices
6. k-nearest neighbors
7. Row-standardization and normalization

Practical Session in Stata

1. Mapping spatial data
2. Creating spatial weights matrices
3. Using spmatrix
4. Exploring neighborhood structures
5. Visualization of spatial patterns

SESSION III: EXPLORATORY SPATIAL DATA ANALYSIS (ESDA)

1. Spatial autocorrelation
2. Global Moran's I
3. Local Indicators of Spatial Association (LISA)
4. Moran scatterplots
5. Spatial clustering
6. Interpretation of spatial dependence patterns

Practical Session in Stata

1. Moran's I computation
2. Spatial autocorrelation diagnostics
3. Cluster detection
4. Spatial exploratory analysis
5. Interpretation of ESDA outputs

SESSION IV: SPATIAL REGRESSION MODELS

1. Linear regression assumptions in spatial settings
2. Spatial Lag Model (SAR)
3. Spatial Error Model (SEM)
4. Spatial Durbin Model (SDM)
5. Spatial spillovers
6. Model interpretation
7. Estimation techniques:
    - Maximum Likelihood,
    - Generalized Method of Moments

Practical Session in Stata

1. Estimating SAR, SEM and SDM models
2. Using spregress
3. Model diagnostics
4. Residual spatial dependence
5. LR, Wald and LM tests

SESSION V: SPATIAL EFFECTS AND MODEL INTERPRETATION

1. Direct effects
2. Indirect effects
3. Total effects
4. Spatial multipliers
5. Spillover interpretation
6. Endogeneity in spatial models
7. Multiple spatial interactions

Practical Session in Stata

1. Computing marginal effects
2. Interpreting spillovers
3. Spatial simulations
4. Advanced model specifications
5. Empirical interpretation of results

EMPIRICAL APPLICATIONS

Throughout the course, participants will work on empirical applications related to:

- regional innovation and knowledge creation;
- R&D collaboration networks;
- technology diffusion;
- electoral geography;
- regional economic performance.

Applications are based on real-world datasets and spatial networks.

SUGGESTED REFERENCES

- Anselin, L. (1988). Spatial Econometrics: Methods and Models (Vol. 4). Springer Science & Business Media.
- LeSage, J., & Pace, R. K. (2009). Introduction to Spatial Econometrics. Chapman and Hall/CRC.
- Fischer, M. M., & Wang, J. (2011). Spatial Data Analysis: Models, Methods and Techniques. Springer Science & Business Media.
- Elhorst, J. P. (2014). Spatial Econometrics: From Cross-Sectional Data to Spatial Panels (Vol. 479, p. 480). Heidelberg: Springer.
- Cameron, A. C. & Trivedi, P. K. (2022). *Microeconometrics Using Stata, Vol. I*: Cross-Sectional and Panel Regression Methods. Second Edition. *Stata Press*
- Cameron, A.C. & Trivedi, P. K. (2022). *Microeconometrics Using Stata, Vol II*: Nonlinear Models and Causal Inference Methods. Second Edition. *Stata Press*.

DATE AND LOCATION

The 2026 edition of this training course will be offered online on a part-time basis on the 2nd-3rd, 5th-6th of November from 9:30am to 1pm Central European Time (CET).

REGISTRATION FEES

Full-time Students*: € 460.00
Ph.D. Students: € 605.00
Academic: € 1100.00
Commercial: € 1480.00

*To be eligible for full-time student prices, participants must provide proof of their full-time student status for the current academic year. Our standard policy is to provide all **full-time students**, be they Undergraduates or Masters, access to our student registration rates. Part-time master and doctoral students on the other hand, who are also currently employed will however, be assigned the standard academic registration fee.

Fees are subject to VAT (applied at the current Italian rate of 22%). Under current EU fiscal regulations, VAT will not however applied to companies, Institutions or Universities providing a valid tax registration number.

The number of participants is limited to 8. Places will be allocated on a first come, first serve basis. The course will be officially confirmed, when at least 5 individuals are enrolled.

Participants will receive: i. lecture materials, Stata do-files developed specifically for the course, and a series of datasets and shapefiles to be used throughout the sessions; ii. a short course licence of *StataNow™* valid for 30 days. The course uses:

- *Stata*'s official **sp** suite;
- spatial panel data commands;
- customized *do-files* and empirical applications.

Individuals interested in attending the training course, must return their completed *registration forms* to TStat by the 20th October 2026.

CONTACTS

Monica Gianni

TStat S.r.l. | Via Rettangolo, 12-14
I-67039 Sulmona (AQ)
T. +39 0864 210101

training@tstat.eu
www.tstat.eu | www.tstat.it