Course and Examination Fact Sheet: Spring Semester 2021

10,276: Regression Analysis for Spatial Data

ECTS credits: 4

Overview examination/s
(binding regulations see below)
Decentral - examination paper written at home (individual) (100%)
Examination time: term time

Attached courses
Timetable -- Language -- Lecturer
10,276,1.00 (GSERM) Regression Analysis for Spatial Data -- Englisch -- Adams Zeno, Füss Roland

Course information

Course prerequisites
Students should be interested in spatial topics such as real estate markets, urban economics, crime, pollution, spatial distribution of political preferences, and trade flows. We assume that students are familiar with matrix algebra, and have had courses in probability theory and econometrics. The course emphasizes programming and empirical application. The empirical implementation of spatial models is done in R, hence some familiarity in R is useful but not required for the course. The course is open to students from the PiF/PEF and other external PhD programs.

Learning objectives
The goal of this course is to provide students with the main tools for analyzing and visualizing spatial data. Students will learn how to estimate and interpret a range of spatial models and how to program own models in R.

Course content
This course focuses on the visualization and modeling of spatial data. Examples are taken from different research areas such as political science, empirical international trade, criminology, and real estate. It offers a detailed explanation of individual estimation methods and their implementation in R. In this course, students will learn

- How to generate a variety of different maps that visualize the location of spatial units
- How maximum likelihood estimation works and how to set up and optimize a likelihood function in R
- How to deal with computational problems that are frequently accounted when working with spatial data
- How to increase computation speed using concentrated maximum likelihood and the matrix exponential spatial specification model
- How to estimate a spatial regression model both, with cross-sectional and with time-series data
- How to properly interpret the output from a spatial regression model and how to investigate policy interventions.
- A basic background on spatial interaction models, heterogeneous coefficient SAR models, and spatio-temporal models

What students do NOT learn in this course:

- Estimation of spatial regression models with other estimation techniques such as IV, NLS, and Bayesian Methods
- The use of a specialized Geographic Information System such as ArcGIS
Course structure

Monday:
Lecture 1: 09:15 - 12:00
R Tutorial 1: 13:00 - 15:00

Tuesday:
Lecture 2: 09:15 - 12:00
R Tutorial 2: 13:00 - 15:00

Wednesday:
Lecture 3: 09:15 - 12:00
R Tutorial 3: 13:00 - 15:00

Thursday:
Lecture 4: 09:15 - 12:00
R Tutorial 4: 13:00 - 15:00

Friday:
Lecture 5: 09:15 - 12:00
R Tutorial 5: 13:00 - 15:00

Times and room information in the timetable apply.

Course literature

Mandatory:

Supplementary / voluntary:


Additional course information

Only for PhD students of the University of St.Gallen:
PiF students may register via regular bidding for the courses offered together by PiF and Global School in Empirical Research Methods (GSERM).

All other PhD students should register for the courses offered by Global School in Empirical Research Methods (GSERM) both via bidding and via GSERM.

In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in Spring Semester 2021, the course information listed above will be changed as follows:

The course is conducted online via zoom
The recordings of the course are permanently available.
The written examination is conducted online and is being monitored.
The lecturer informs the students concerning the changed implementation modalities of the course.

**Examination information**

**Examination sub part/s**

1. Examination sub part (1/1)

**Examination time and form**
Decentral - examination paper written at home (individual) (100%)  
Examination time: term time

**Remark**
Paper Replication or own research idea

**Examination-aid rule**
Term papers

Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship which is a published template in StudentWeb.

The documentation of sources (quotations, bibliography) has to be done throughout and consistently in accordance with the chosen citation standard such as APA or MLA.

For papers in law, the legal standard is recommended (by way of example, cf. FORSTMOSER, P., OGOREK R. et SCHINDLER B., Juristisches Arbeiten: Eine Anleitung für Studierende, newest edition respectively, or according to the recommendations of the Law School).

The indications of the sources of information taken over verbatim or in paraphrase (quotations) must be integrated into texts in accordance with the precepts of the applicable quotation standard, while informative and bibliographical notes must be added as footnotes (recommendations and standards can be found, for example, in METZGER, C., Lern- und Arbeitsstrategien, newest edition respectively.

For any work written at the HSG, the indication of the page numbers is mandatory independent of the chosen citation standard. Where there are no page numbers in sources, precise references must be provided in a different way: titles of chapters or sections, section numbers, acts, scenes, verses, etc.

**Supplementary aids**

- **Examination languages**
  Question language: English  
  Answer language: English

**Examination content**

- SAR model, SDM model, CML, MESS, Spatial Interaction model, Spatial Panel model, HSAR model


**Examination relevant literature**
Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers’ websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 12 are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 28 January 2021);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 22 March 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 12 (Monday, 22 March 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 14 (Thursday, 8 April 2021).