

# LAND USE ECONOMICS AND SPATIAL MODELING

AREC 647

Fall 2020

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**Instructor:** Jordan Suter

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**Office Hours (Clark B-314):** Wed. 2–3 (online) and by appointment (in person or online)

**Description:**

This course will focus on the utilization of spatial data in economic analysis, with an emphasis on evaluating how policy and human behavior determine land use outcomes. Special attention will be given to statistical analysis of data that describes and appropriately accounts for spatial relationships between observations. In addition to reviewing the classical literature in land economics, the course content will analyze the factors that drive the development of privately owned land and the incentives generated by conservation policies and programs. The course also covers applied research topics related to public lands management, the land use implications of wildfire, and the relationship between the incentives that drive the use of land and water resources.

**Course Objectives:**

- (1) Learn how to incorporate variables calculated using geographic information systems data into economic analyses.
- (2) Develop an understanding of how to utilize spatial variation in causal identification strategies and how to appropriately account for spatial correlations in the representation and statistical analysis of spatial data.
- (3) Gain exposure to seminal research in land economics as well as emerging research in the areas of conservation planning and policy, wildfire economics, and water management.
- (4) Apply research and presentation skills through incorporating spatial modeling into an economic research poster.

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**Readings:**

The readings will come primarily from journal articles and textbook chapters that will be made available through Canvas. The readings that are required for a given section of the course are indicated in the schedule below and readings for specific class sessions will be announced in class. All documents, including problem sets and exams, will be posted on the Canvas site for this class.

**Grading (out of 100%):**

Homework assignments (25%) – You will be given one week to complete each problem set that will involve a combination of computational and analytical problems.

Participation (5%) – I expect you to attend each class having completed the reading assigned for that day and prepared to contribute to the discussion. On some occasions I will ask you to prepare your thoughts on how you would expand or improve the analysis provided in the assigned reading.

Poster (25%) – Each student will conduct a research project that utilizes spatial data in an empirical analysis that addresses an economic research question. The poster should present the research question, background, and findings in a concise and visually appealing way.

Presentations (10%) – You will present your work on two occasions during the semester. The first occasion will involve presenting a hedonic modeling exercise. The second presentation will be based on the research work that you carry out for your poster.

Midterm exam (15%) – The midterm will be a take home exam that includes several short problems that will require both analytic and computational solutions.

Final exam (20%) – The comprehensive final exam will be administered during the exam period.

Final grades will be based out of 100 percent, weighted according to the values above. Letter grades will be assigned using the scale: A (100–90), B (89–80), C (79–70), D (69–60), F (59 and below).

**All students should fill out a student-specific symptom checker each day before coming to class** (<https://covidrecovery.colostate.edu/daily-symptom-checker/>). In addition, please utilize the symptom checker to report symptoms, if you have a positive test, or exposed to a known COVID contact. If you know or believe you have been exposed or are symptomatic, it is important for the health of yourself and others that you report it through this checker. You will not be in trouble or penalized in any way for reporting. If you report symptoms or a positive test, you will receive immediate instructions on what to do and CSU's Public Health Office will be notified. Once notified, that office will contact you and most likely conduct contact tracing, initiate any necessary public health requirements and/or recommendations and notify you if you need to take any steps. For the latest information about the University's response, please visit the **CSU COVID-19 site** (<https://covidrecovery.colostate.edu/>).

### **Need Help?**

CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help (970.491.6053, <http://health.colostate.edu>). If you are concerned about a friend or peer, tell someone by calling 970.491.1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (<http://supportandsafety.colostate.edu/tellsomeone>).

### **Accommodations:**

If you are a student who will need accommodations due to a disability or chronic health condition, please make an appointment with me to discuss your individual needs. Any accommodation must be discussed in a timely manner prior to implementation. A verifying accommodation letter from Resources for Disabled Students is required before any accommodation is provided. The Student Disability Center is available at <https://disabilitycenter.colostate.edu/> and is located in TILT, room 121 or reachable via phone at 970-491-6385.

### **Course Outline and Schedule:**

- I. Foundations of land economics and R programming**
  - Seminal economic ideas on land use and land rent from Ricardo and von Thunen.
  - Programming in R.
- II. Managing spatial data and spatial spillovers**
  - Managing spatial data in R (<https://tmieno2.github.io/R-as-GIS-for-Economists/>)
  - Economics implications of spatial linkages across landscapes.
- III. Land use change and private land conservation**
  - Applied models of land use change.
  - Sprawl at the rural-urban fringe, economic analysis of conservation policies.
- IV. Optimization and hedonic models**
  - Optimal design of conservation policy and site selection.
  - Hedonic models applied to residential and agricultural land and.

## V. Econometric tools

- Parametric spatial lag and spatial error models, nonparametric measures.
- Using matching methods to improve counterfactual analysis.
- Identifying causal impacts with spatial discontinuities.

## VI. Public land management

- Managing land for multiple use, valuing wildlife and recreation, public land impacts on local economic outcomes.

## VII. Wildfire and invasive species

- Research related to wildfire economics and invasive species management.

### Schedule

Week	Assignment	Topic	Readings
24-Aug 31-Aug		Land economics foundations and R programming	Barlow Ch.6; Angelsen 2010; Mendelsohn 1994; Severen et al 2018; Applied Econometrics in R Ch. 2
7-Sep 14-Sep	PS1	Managing spatial data and spatial spillovers	Peterson et al. 2014; Jain 2020 Mieno Preface and Ch.1-4
21-Sep 28-Sep	PS2	Land use change and private land conservation	Brueckner 2000; Lawler et al. 2017; Wrenn 2019; Hanley et al. 2012; Hellerstein 2017; Ferris and Lynch 2014
5-Oct 12-Oct		Land use optimization Hedonic modeling	Newburn 2005; Polasky et al. 2008; Williams et al. 2004 Freeman 2001; Hennighausen and Suter 2020; Ma and Swinton 2011; Walls et al. 2015
19-Oct 26-Oct 2-Nov	PS3/Pres. 1 Midterm	Econometric tools: Spatial econometrics, matching methods, spatial discontinuities	Anslin 2002; Sarmiento-Barbieri 2016; Wheeler et al. 2020; Skevas et al. 2018 Arriagada et al. 2012; Costedoat et al. 2015 Ge et al. 2020; Cuaresma et al. 2017; Hornbeck and Keskin 2015
9-Nov 16-Nov	PS4	Public land management	Holmes et al. 2016; Ferraro et al. 2011; Walls 2020 Runge et al. 2018; Yoder, Ohler and Chouinard 2014
23-Nov		Thanksgiving	
30-Nov 7-Dec	PS5 Poster Pres	Wildfire and invasive species	Montgomery 2014; Warziniack 2019; Albers et al. 2018; Ephanchin-Niell and Wilen 2014