

# LAND USE ECONOMICS AND SPATIAL MODELING

AREC 647

Fall 2015

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**Instructor:** Jordan Suter

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**Office Hours (Clark B-306):** Tue. 2–3, Wed. 12–2, and by appointment

**Description:**

This course will focus on the utilization of spatial data in economic analysis, with an emphasis on evaluating the behavior and policy that determine land use outcomes. Special attention will be given to statistical analysis of data that describes and appropriately accounts for spatial relationships between observations. The course content will address how researchers in the field analyze the location decisions of firms and households and how these decisions cumulatively determine the extent of land development. In addition to reviewing the classical literature in land economics, we will cover applied research topics related to land conservation, public lands management, and land use implications of wildlife, wildfire, invasive species, water and energy.

**Course Objectives:**

- (1) Learn how to incorporate variables calculated using geographic information systems data into economic analyses.
  - (2) Develop an understanding of 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 wildfire economics, invasive species, and conservation planning and policy.
  - (4) Apply research and presentation skills through incorporating spatial modelling into an economic research paper.
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**Readings:**

The readings will come primarily from journal articles that will be made available through the Canvas system. 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 (20%) – You will be given one week to complete each problem set. You are allowed to work on the assignments with one other student. If you choose to work with another student, please turn in one assignment with each of your names at the top. I expect each individual to fully understand all solutions provided.

Participation (10%) – 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.

Paper (15%) – Each student will write a paper describing how a peer reviewed article from the economics literature could be improved by incorporating spatial analysis. My expectation is that you will go beyond simply stating that the paper should control for spatial autocorrelation or heterogeneity. I want you to be thinking about how adding spatial dimensions to the research

questions could alter the economic incentives of decision makers and/or the policy implications of the research results. The best papers will discuss possible data sources and modelling approaches that could be employed although it is not required that you actually carry out the analysis.

Presentations (15%) – You will present your work on two occasions during the semester. The first occasion will involve presenting a hedonic modelling exercise that will be completed with a partner. The second presentation will be based on the independent work that you carry out for your paper.

Midterm exam (20%) – 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 (Tuesday, Dec. 15<sup>th</sup> from 4:10-6:10pm).

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).

### **Academic Integrity:**

This course will adhere to the Academic Integrity Policy of the CSU General Catalog and the Student Conduct Code. I expect all work to be your own. Cases of plagiarism in written work will be taken seriously, so please familiarize yourself with CSU's guide to avoiding plagiarism (<http://writing.colostate.edu/guides/researchsources/understandingplagiarism/plagiarismoverview.cfm>).

### **Resources for Disabled Students:**

If you have a documented disability and wish to discuss academic accommodations, please contact me as soon as possible to set up the appropriate arrangements. Please do not wait until the day before an exam to request accommodations. Further information - <http://rds.colostate.edu/students>

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

- I. Foundations of land economics**
  - Seminal economic thinking related to bid-rent functions and land use outcomes from Ricardo, von Thunen, Tiebout and Mills.
- II. Spatial data and measures**
  - Working with spatial data in ArcGIS and R, generating spatial measures.
- III. Spatial econometrics and empirical methods**
  - Parametric spatial lag and spatial error models, nonparametric measures.
- IV. Hedonic and land use change modeling**
  - Hedonic models applied to residential and agricultural land, predictive models of land use change.
- V. Land use and conservation policy on private land**
  - Sprawl at the rural-urban fringe, transferable development rights, development taxes, conservation easements.
- VI. Wildlife, optimal conservation design and public lands**
  - Reserve site selection models, habitat fragmentation, public lands management.
- VII. Applied spatial models related to resource and land management**
  - Research related to wildfire economics, invasive species management, and land use implications of energy and water resources.

## Tentative Schedule

<b>Week</b>	<b>Assignments</b>	<b>Topic</b>	<b>Readings</b>
24-Aug 31-Aug		Foundations of land economics	Samuelson 1959,1983; Tiebout 1956; Mills 1967; Medelsohn 1994; Bahzhaf and Walsh 2008
7-Sep 14-Sep	PS1	Utilizing spatial data and generating spatial measures	Dell 2009; Peterson et al. 2014
21-Sep		Spatial econometrics	Anselin 2002; LeSage and Pace 2008
28-Sep 5-Oct	PS2	Hedonic and land-use change models	Irwin et al. 2009; Freeman 2001; Geoghegan et al. 1997; Irwin 2002; Newbern and Berck 2006; Radeloff et al. 2012; Bateman et
12-Oct 19-Oct	Presentation 1 PS3	Land use and conservation policy on private land	Ferris and Lynch 2014; Brueckner 2000; McConnell et al. 2006; Banzhaf and Lavery 2010;
26-Oct 2-Nov 9-Nov	Midterm (10/28)	Wildlife, conservation design and public lands management	Polasky et al. 2008; Andam et al. 2010; Lewis and Plantinga 2008; Lewis and Nelson 2014; Williams et al. 2004
16-Nov 23-Nov	PS4	Wildfire and invasive Thanksgiving	Montgomery 2014; Konoshima et al. 2008; Sancherico et al. 2010; Kaiser and Burnett 2010
30-Nov 7-Dec	Paper Presentation 2	Land use implications of water and energy resources	Watanabe et al. 2008; Hornbeck and Keskin 2015; Weber 2012; Henderson et al. 2012