GISC7364 Syllabus: Demographic Analysis and Modeling

Instructor:

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Office hours: Wednesdays 4:00-5:00 pm, when the office door is open or by appointment.

Meeting Time and Location:

Thursday 7:00-9:45 pm in GR3.206

Pre-requisites, Co-requisites, & other restrictions:

- An intermediate statistical course on the level of applied regression analysis.
- Preferable some knowledge on working with the R-project's statistical programming language.
- Skills to download and manipulate demographic data-sets.
- Knowledge of geographic information systems [GIS] is not required. Participants are encouraged to attend a workshop on exploring GIS at the beginning of the semester.
- Consent by the instructor.

Course description:

This course examines demographic data sources, measures and models used to describe, analyze, estimate and project spatio-temporal population distributions and their key demographic characteristics. The underlying theoretical foundations and possible extensions into the spatial domain are covered. Understanding of spatio-temporal population dynamics, either on a local or global scale, is essential in many disciplines engaged in planning for the public and private sectors, for transportation, residential or for regional development projects.

Objectives:

- Learn to identify, use and combine relevant demographic data sources.
- Understand an exhaustive set of descriptive demographic measures.
- Understand the key factors influencing dynamics of shifting population characteristics.
- Work with key demography models, such as the demographic accounting equation, standardization approaches, life tables, cohort component methods, and spatial interactions.
- Learn to assess and handle uncertainties within demographic models.

Suggest Textbook:

Plane, David, and Rogerson, Peter. (**1994**). *The Geographical Analysis of Population: With Applications to Planning and Business*. Wiley. Please check used books websites.

Schedule:

Date	Topic	Action & Due Dates
Jan 13	Introduction	
Jan 20	*Makeup GIS Day*	
Jan 21	*Explore GIS Workshop*	
Jan 22	*Explore GIS Workshop*	
Jan 24	*R-Introduction [ECON4355]*	
Jan 27	Regression Analysis and R	Lab01: Concepts
Feb 03	Data Sources, Surveys and Sampling	Lab02: Sources
Feb 10	Population Distributions	Lab03: Sampling & IRR Training
Feb 17	Period and Cohort Perspective / Demographic Indices	Lab04: Distributions
Feb 24	Life-Tables. Stable and Stationary Populations.	Lab05: Indices
Mar 03	Matrix Algebra	Lab06: Life-Tables
Mar 10	Cohort Component Models	
Mar 17	*Spring Break*	
Mar 24	*Mid-Term* (up to Life-Tables)	
Mar 31	Poisson & Logistic Regression	Project Proposal
Apr 07	Spatial Interaction Models	Lab07: CCM
Apr 14	*Makeup GIS Day – AAG meeting*	Lab08: Spatial Interaction
Apr 21	Special Topic	
Apr 28	*Final Exam* (from CCC to Spatial Interaction)	
May 05	*Project Presentations*	

Suggested special topics (one will be picked):

- Small area estimations: Linking global structural information with limited local information for local predictions.
- Cox regression: Used to model life-expectancies (time until an event occurs or monitoring ends) subject to a set of co-variables.
- Ecological growth models: Differential models of growth with and without carrying capacity constraints, two populations' growth models subject to competition and prey-predators relationships.
- Predictive models: Autoregressive and moving average models.
- Demographics: Business applications of demography. Use of factor analysis and cluster analysis.
- Simulations: Simulation of demographic processes and assessment of error propagation.
- Linkages between epidemiology and demography.

Project Topics:

To find a project topic you may want to browse the following edited volumes or demographic journals:

- Murdock, Steve H., and Swanson, David, eds. (**2008**). *Applied Demography in the 21st Century*. Springer Verlag
- Poston, Dudley L., and Micklin, Michael, eds. (**2006**). *Handbook of Population*. Springer Verlag
- Siegel, Jacob S., and Swanson, David A., eds. (**2004**). *The Methods and Materials of Demography*. 2nd edition, Elsevier Academic Press

These resources are available from our McDermott Library in print, as eJournals and eBooks.

Grading:

Quantity	Task	Points
8	Labs @ 5 points. The weakest lab will be upgraded to 5 points	40
2	Exams @ 20 points. Open book and open notes (2nd exam may be take-home with participants consent)	40
1	Project @ 5 points proposal, 5 points presentation and 10 points documentation	20