

**University of Florida College of Public Health and Health Professions
PHC 6194: Spatial Epidemiology
Fall 2014**

Instructors:

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Office hours: Tuesday 10:00am-12:00pm

Teaching Assistant: NA

Class Schedule: Monday 11:45AM-2:45PM

Classroom: HCSL C2-3

Course Description and Goals

This course provides a basic understanding of the concepts and techniques of Geographic Information Systems (GIS) and exploratory spatial data analysis (ESDA) as applied to epidemiological research. Basic descriptive and analytical functions of GIS will be introduced along with additional spatial and geographic concepts including: cartographic communication, automated mapping characteristics, map projections and map scale, geocoding, coordinate systems, the nature of spatial public health data, and spatial statistical methods.

This is an application-oriented course with a strong emphasis on students gaining a hands-on experience in the use of GIS, mapping, and spatial data analysis software. No previous knowledge of mapping or GIS is assumed, but one is expected to have a working knowledge of MS Office, Windows operating systems, and Biostatistics (prerequisites listed below).

Course Objectives

Students will be able to:

1. Become familiar with concepts, technical issues, and applications appropriate for GIS technology. This includes the ability to map spatial data; link spatial data; conduct spatial queries, and analyze feature relationships etc.
2. Use GIS tools to specify and characterize populations and communities for public health intervention and research. This includes the competency to access, download, and process census attribute data for linking to maps.
3. Apply and interpret the concept of spatial autocorrelation (SA) and be able to assess SA in data
4. Interpret basic spatial data analysis methods including cluster detecting and small area estimation, and confounding by spatial neighborhood.
5. Map disease and mortality rates

Prerequisites

Introduction to Biostatistical Methods (PHC 6052), Regression methods for the Health and Life Sciences (PHC 6053), Epidemiology Research Methods I (PHC 6000) and Epidemiology Research Methods II (PHC 6011) or consent of the instructor.

Course Materials

Required Textbook:

Kristen S. Kurland and Wilpen L. Gorr. GIS Tutorial for Health. ESRI press. 4th Edition. 2012.

Note: If you buy this required textbook, it will also provide you a trial version of ArcGIS software for 180 days.

Supplemental Textbooks

- Ormsby, Tim, Eileen Napoleon, Robert Burke, Carolyn Groess and Laura Feaster. Getting to Know ArcGIS Desktop. Redlands, CA: ESRI Press, 2nd Edition. Updated for ArcGIS 9.3 2004.
- [Ellen K. Cromley](#) [Sara L. McLafferty](#). GIS and Public Health. NY: Guilford Publications, Inc. 2002
- [Lance A. Waller](#), [Carol A. Gotway](#). Applied Spatial Statistics in Public Health Data. NJ: Wiley Interscience, A John Wiley & Sons, Inc. 2004.

Recommended Reading

1. [Statistics in Medicine](#) Volume 19, Issue 17-18, 2000. **Special Issue: Disease Mapping with a Focus on Evaluation.** Issue Edited by Andrew Lawson, Annibale Biggeri, Charmaine Dean, Lance Waller. Copyright © 2000 John Wiley & Sons, Ltd.
2. Andrew Lawson et al. *Disease mapping* and risk assessment for public health. Chichester ; New York : Wiley, c1999.
3. *Andrew B. Lawson, Fiona L.R.... An introductory guide to disease mapping* .Chichester ; New York : John Wiley, c2001
4. Brent H. Hoff and Carter Smith III ; Charles H. Calisher, consulting editor. Mapping

epidemics: a historical atlas of **disease**. New York: Franklin Watts, [2000?]

5. Thomas C. Ricketts et al. Geographic methods for health services research : a focus on the rural-urban continuum, Lanham, MD : University Press of America, c1994.
6. Andrew D. Cliff and Peter Haggett. Atlas of disease distributions: analytic approaches to epidemiological data. Oxford, UK ; New York, NY, USA : Basil Blackwell, 1992

Software & Equipment

A personal laptop is required for this course. You must acquire commercial GIS software including ArcGIS 10.2 and free downloadable software SaTScan and GeoDa. We also note other software packages that are available.

1. ArcGIS Version 10.2 Environmental Systems Research Institute (ESRI).
ArcGIS is a scalable system of software for geographic data creation, management, integration, analysis, and dissemination for every level of data organization, from an individual to a globally distributed network of people. ArcGIS is a family of software products.
Students should contact the [Software Licensing Services](#) to get site licensed copy of ArcGIS for a small fee.
2. GeoDa - An Introduction to Spatial Data Analysis — GeoDa
[GeoDa](#) was developed by Luc Anselin and co-workers and is designed to implement techniques for exploratory spatial data analysis (ESDA) on lattice data (points and polygons). It is intended to provide a user-friendly and graphical interface to methods of descriptive spatial data analysis, such as spatial autocorrelation statistics and indicators of spatial outliers, as well as spatial modeling. It is a free software program. Download [OpenGeoDa version 0.9](#). Also download the GeoDa 0.9 User's Guide (<http://geodacenter.org/downloads/pdfs/geoda093.pdf>) and the GeoDa 0.95-I Release Notes (<http://geodacenter.org/downloads/pdfs/geoda095i.pdf>).
3. SaTScan™ software has been developed to analyze spatial, temporal and space-time count data using the spatial, temporal, or space-time scan statistics. It is a free software program and can be downloaded from [SaTScan](#)

Sakai system

Sakai system is accessible at lss.at.ufl.edu or through my.ufl.edu. You must have a valid Gatorlink ID and password. For assistance, call the UF Help Desk at 392-HELP.

Required: Students will need to log onto Web CT and print all electronic files before each class, with the exception of the first class. If materials are not posted in Web CT, we will provide the hardcopies in class. Students are responsible for all course material, including reading all required materials prior to each class. Readings will be assigned from historical or current scientific research literature. Readings will be posted when assigned, e.g., the week before they are due (or earlier).

Course Requirements

Since this is a hands-on course, attendance of all classes is required. Students should read all required materials and complete all laboratory exercises.

Grading

Grades will be based on points accumulated for class attendance and participation, lab exercises, the in-class project, and final project. Total points earned will be based on the following:

<u>Component</u>	<u>Percent</u>
Class attendance/participation	10%
Assignments	50%
Final project/presentation	40%

The grading scale for this course consists of the standard scale, including minus grades, below:

93% - 100% = A	73% - 76% = C
90% - 92% = A-	70% - 72% = C-
87% - 89% = B+	67% - 69% = D+
83% - 86% = B	63% - 66% = D
80% - 82% = B-	60% - 62% = D-
77% - 79% = C+	Below 60% = E

Course Policies

Feedback on Assignments: Timely feedback on assignments is needed in order to assure that students are aware of their progress. For routine lab exercises, in-class project, and the final project, feedback will be provided within two weeks after the due date. Generally we will return to you the corrected problem set the week after it is turned in. Be prepared to describe your concerns with grading for the entire assignment, not just a component of your interest. Therefore, unless there is an anomaly (we might have added your points incorrectly, for example), your answer will be reviewed in the context of the whole class and your performance on the entire assignment.

Classroom etiquette: Please come to class on time and be prepared to stay until the time scheduled as the end of class. We think your investment in the degree is worth our maximizing you in-class experience, and we usually provide materials that extend the full, scheduled class times.

Pagers and cell phones should not be used in class. Please turn them off. Or, if you expect urgent calls, set them to “vibrate.”

The second most common complaint we have received during teaching is “side” conversations among students. Unless your conversation is a quick one, please consider that your conversation may interrupt the attention of someone seated near you. We welcome in-class questions. If you have trouble getting our attention during a vigorous in-class discussion, raise your hand and/or use a loud voice. Your question will nearly always be one that other students also have. Your questions will help us in that session, or to assess what

kinds of issues and examples we should research and bring to class in the next session (or in future iterations of the class).

Academic Integrity: Each student is bound by the academic honesty guidelines of the University and the student conduct code printed in the Student Guide and on the University website. The Honor Code states: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” Cheating or plagiarism in any form is unacceptable and inexcusable behavior.

Policy on Style for Citation and Plagiarism:

The two key purposes of citation are to 1) give appropriate credit to the authors of information, research findings, and/or ideas (and avoid plagiarism) and 2) facilitate access by your readers to the sources you use in your research. In this class, you will be preparing a critique on one epidemiology study article, and it does not require referencing. In fact, direct quotation will not be a positive method of writing the literature critique. However, the issue of citation and plagiarism may be relevant now, and certainly in the future, so I include a discussion here. It is your responsibility to read the policy and ask questions if you do not understand the policy or have specific concerns or question.

Quotations: When directly quoting an outside source, the borrowed text, regardless of the amount, must be surrounded by quotation marks or block quoted. Quoted text over two lines in length should be single-spaced and indented beyond the normal margins. Every quote must include a source—the author, title, volume, page numbers, etc.—whether an internal reference, footnote, or endnote is used in conjunction with a bibliography page.

Paraphrasing or Citing an Idea: When summarizing an outside source in your own words or citing another person’s ideas, quotation marks are not necessary, but the source must be included. This includes, but is not confined to, personal communications from other students, faculty members, experts in the field, summarized ideas from published or unpublished resource, and primary methods derived from published or unpublished sources. Use the general concept of “when in doubt – cite.”

Plagiarism is a serious violation of the academic honesty policy of the College. If a student plagiarizes others’ material or ideas, he or she may receive an “E” in the course. The faculty members may also recommend further sanctions to the Dean, per College disciplinary action policy. Generally speaking, the three keys of acceptable citation practice are: 1) thoroughness, 2) accuracy, and 3) consistency. In other words, be sure to fully cite all sources used (thoroughness), be accurate in the citation information provided, and be consistent in the citation style you adopt. All references should include the following elements: 1) last names along with first and middle initials; 2) full title of reference; 3) name of journal or book; 4) publication city, publisher, volume, and date; and 5) page numbers referenced. When citing information from the Internet, include the WWW address at the end, with the “access date” (i.e., when you obtained the information), just as you would list the document number and date for all public documents. When citing ideas or words from an individual that are not published, you can write “personal communication” along with the

person's name and date of communication. Typical formats for citing references and books can be found in the *American Journal of Public Health*.

We urge you to review the University site on plagiarism

<http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html> and the site also links to a number of “best” policies at other universities.

Class Attendance: Class attendance is mandatory. Excused absences follow the criteria of the UFL Graduate Catalogue (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to the missed class day when possible. UFL rules require attendance during the first two course sessions (Teachers are required to take roll for the College), and students also must attend all course sessions of student presentations for this class. Missing more than two scheduled sessions will result in a failure. Two weekly sessions are the equivalent of about 15% of the course contact hours. Regardless of attendance, students are responsible for all material presented in class and meeting the scheduled due dates for class assignments. Finally, students should read the assigned readings prior to the class meetings, and be prepared to discuss the material except for the first class session.

Policy on Make-Up Work: Students are allowed to make up work ONLY as the result of illness or other unanticipated circumstances warranting a medical excuse and resulting in the student missing a homework or project deadline, which is consistent with College policy. Documentation from a health care provider is required. Work missed for any other reason will receive a grade of zero.

Accommodations for Students with Disabilities: Students requiring accommodations must first register with the Dean of Students' Office. The Dean of Students' Office will provide documentation to the student who must then provide this documentation to the faculty member when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework. We all learn differently: however, if you have experienced problems in university classes with writing, in-class exams, understanding or concentrating in class; please talk to me or access a learning or education testing resource at the University or in another professional setting. For your assistance, should you need them, please consider either of the following:

University Counseling Services

<http://www.counsel.ufl.edu/base.asp?include=counselingServices.inc>

P301 Peabody Hall – 392-1575

Student Mental Health Services in the Student Health Care Center

<http://www.health.ufl.edu/shcc>

Room 245, Infirmary Bldg.- 392-1171

Schedule of PHC 6937 (Spatial Epidemiology) Classroom Sessions and Readings

Week	Date	Instructor	Topic	Homework	Textbook / Required Readings	Additional References
1	Aug. 25	Xu	Overview of the course; Basics of ArcGIS user interface: ArcCatalog, ArcMap & ArcToolBox; Introduction of Spatial data;	HW 1	Textbook: Chapter 1: Tutorials 1-1, 1-2, 1-3, 1-4 Chapter 2: All tutorials	<i>Database Concepts:</i> http://www.colorado.edu/geography/gcraft/notes/datacon/datacon_f.html A C Gatrell Concepts of space and geographical data , P. 199-34 in Geographic Information Systems and Science - John Wiley & Sons, Ltd. http://www.wiley.com/legacy/wileychi/gis/Volume1/BB1v1_ch9.pdf ArcGIS: Add X and Y as a layer
	Sep 01		No class: Labor Day			
2	Sep. 08	Xu	Introduction: Spatial Epidemiology;	HW 2	.	<i>Ellen K. Cromley. GIS AND DISEASE.</i> . Annual Reviews of Public Health Volume 25 Issue 1, Page 7-24, May 2003.
3	Sep. 15	Xu	Introduction: map projection and coordinate system Practice: map projection	HW 3		
4	Sep. 22	Xu	Introduction of Geocoding Practice: Geocoded	HW 4		ArcGIS: An Overview of Geocoding Creating an Address Locator
5	Sep 29	Xu	Spatial data management and Working with attribute table	HW 5		
6	Oct. 06	Xu	Introduction network analysis and application	HW 6		
7	Oct. 13	Xu	Introduction of Disease mapping: data creation, cartography Tips & map layout Practice: Disease mapping	HW 7		

8	Oct. 20	Xu	Disease mapping: Smoothing Practice: introduction of Geoda	HW 8	<i>GIS and Public Health</i> , "Kriging" (p. 200-204) AND <i>GeoDa 0.9 User's Guide</i> : pages 1-18 and 47-53.	
9	Oct. 27	Xu	Disease cluster analysis (Sandie, Spatial interpolation)	HW 9	Reading handout will be made available on the course website AND <i>GeoDa 0.95-i Release Notes</i> : pages 45-57.	
10	Nov. 03	Xu	Geographic Correlations and Spatial Regression	HW 10		
	Nov. 10	Xu	Disease Cluster-SaTscan	HW 11		
11	Nov. 17	Xu	Introduction of WinBugs			
12	Nov. 24	Xu	Introduction of WinBugs 2			
13	Dec 01 (Friday)	Xu	Final Presentation			