SYLLABUS
Public Health, EHS 207
Introduction to Geographic Information Systems for Public Health
Spring 2018

Lectures: Thursdays 3:00pm-4:50pm, CHS 41-235
Labs: Wednesdays 9:00am-10:50am

Instructor:

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Background and Learning Objectives
Geographic information systems (GIS) have emerged as an important method for performing public and environmental health analyses. GIS is generally seen as a spatial analysis system for the organization, storage, retrieval and analysis of data for which the location and other spatial attributes are considered important (e.g., incidence of a specific disease condition in relation to a pollution source). GIS also encompasses the organizational structure, personnel, software and hardware needed to support spatial analysis. For many health and social scientists, GIS has evolved into in a new means for viewing their work. The course will provide students with an introduction to this exciting and expanding field of inquiry. On successful completion of the course you should possess the following skills and knowledge:

1. A basic understanding of the fundamental geographic and cartographic concepts that underlie GIS.
2. Working knowledge of ArcGIS, a powerful "desktop" GIS software package that runs in

a Windows environment.
3.   Introductory knowledge of past, present, and possible future applications of GIS for public health and environmental studies.
4.   Appreciation of the ethical, political, organizational, and economic issues related to GIS.

Dr. Jerrett will be primarily responsible for the lecture component of the course. Mr. Lipsitt will introduce the lab assignments.

ASPH Competency Areas Covered in this Course

C6 Identify key sources of data and use existing databases to provide background or supportive data to address research questions.

I5.1 Use at least three of these assessment methods: quantitative risk assessment; burden of disease using disability-adjusted life years; spatial analysis and geographic information systems; health impact assessment; alternatives assessment.

I5.2 Identify areas of uncertainty in exposure and risk assessment processes.

A1 Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields.

A2 Use existing databases to provide background information or data to address research questions and draw appropriate inferences/estimates from environmental health data.

A3 Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them.

C1 Use computer systems and analytic software packages.

C2 Produce working tables, statistical summaries, and effective figures to summarize data.

E1 Prepare presentation materials including outlines, posters, and Powerpoint presentations.

E2 Deliver effective oral presentations individually and as part of a team.

Textbooks

Recommended

Bolstad, P. 2008. GIS Fundamentals, 3rd Edition. $40, from Atlas Books ISBN: 978-0-
9717647-2-9 www.atlasbooks.com, (800) 247-6553.

Required

Environmental Systems Research Institute (ESRI). 2014. GIS Tutorial for Health: **Fifth**
Edition. Redlands CA: ESRI Press. - *Available through ESRI press:*
http://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=220
or resellers such as Amazon.com: https://www.amazon.com/Tutorial-Health-fifth-Kristen-Kurland/dp/1589483723
Please obtain quickly.

Computers

Computers with ArcGIS are available for checkout from the Biomed library (newer MacBooks
using Bootcamp are preferable). Other options exist on campus including the CHS TLC lab,
and other Library computers. The two computers in the Public Health Lounge are also ideal.
Student licenses are available through your textbook (these licenses are not ideal for the lab
assignments but should suffice if you own an upper-end PC; check tech specs with Mr. Lipsitt
before proceeding with installation if you are concerned.)

Course Requirements and Grading

There will be two hours of lab time and two hours of lectures each week. The
major components of the course are listed below.

Lab assignments—30% (3*10)
ESRI tutorial assignments — 10%(8*1.25)
Project presentation—10% (1*10)
Project annotated bibliography—10% (1*10)
Midterm Exam—15% (1*15)
Final exam (take home)—25% (1* 25)

Note: Assignments will consist of book exercises (submitted to CCLE; graded on submission) and instructor-
provided labs (submitted by print to TA; graded out of 100). All assignments are due **at 9am** on due date. A 10%
penalty will be deducted for late assignments per day. Late assignments will not be accepted after 3 days (the
following Saturday) unless you make provisions for extension based on extenuating circumstances with Dr. Jerrett
or Mr. Lipsitt. Midterm exam will consist of multiple choice, short answer, open ended and critical thinking
problems. Final exam will take the form of a cumulative take-home assignment.

Organization and Approach

The lectures cover material related to topics in your textbook and associated material. Lectures will also cover current and future uses of GIS in public health and environmental analyses. Labs and lab assignments are to learn how work with data in ArcGIS. Supporting material is in the ESRI (2014) text. The lab assignments will reinforce the theoretical and conceptual lecture material with practical examples.

The major project will entail production and presentation to the class of a status report on the current uses of GIS in an applied field of public health or environmental analyses. No prior knowledge of either the theoretical or computing aspects of the course is assumed, although some basic understanding of statistics is expected.

My intention here is to ensure your grade does not suffer too much from one "bad day." I also want to ensure you do not fall behind in covering the lab material, because it will be difficult to be successful on the lab exam if you do not keep up with the lab assignments.

All students are reminded of the seriousness of academic dishonesty of any form and particularly that of plagiarism. You are expected to complete your lab assignments and projects independently.

Course Schedule

Week 1 (week of **April 2**): **Organization Outline and Introduction to GIS Concepts and Methods**

> Readings

> - Jerrett, M., Gale, S., & Kontgis, C. (2010). Spatial Modeling in Environmental and Public Health Research. *International Journal of Environmental Research and Public Health*, *7*(4), 1302-1329.

> *Note: Students are expected to assign one reading per major project presentation, one week in advance of the class. All students are required to read the article and be prepared to discuss the contents during the presentation or after the presentation. Sign ups for presentation dates will be today.*

> *Note: No Lab this week*

Week 2 (week of **April 9**): **Introduction to Lab Structure; Place as Determinant of Health and Intro to Data Structures**

Lab assignment 1 handed out

> Readings

- ESRI Chapt. 1 & 2 – *Submit* *either* exercise 2-1 or 2-2 from ESRI's book **(due April 12)**

(Textbook assignments are due at 9:00am, <u>before</u> lab, to CCLE)

Note: Lab starts this week and is every week unless otherwise announced.

Week 3 (week of **April 16): Projections and Coordinate Systems**

Readings
- Bolstad Chapt 3 (Required)
  * VERY IMPORTANT TO READ BEFORE CLASS FOR YOU TO UNDERSTAND AND FOLLOW THE LECTURE
- ESRI Chapt. 3 – *Submit* a PDF map from *either* exercise 3-1 or 3-2 and follow the instructions in the ESRI book on what to submit (**due April 18**).

Note: Field exercise on using GPS this week

Week 4 (week of **April 23): Data Structures and Projections**

Readings

- ESRI Chapt 4 – *Submit* a PDF map from *either* exercise 4-1 or 4-2 and follow the instructions in the ESRI book on what to submit (**due April 25**).

Lab assignment 1 due (in Lab @9am to TA, *printed*)
Lab assignment 2 handed out

Note: Student presentations begin this week in Lecture

Week 5 (week of **April 30): GIS Data Input, Capture, Storage, and Geocoding**

Readings
- ESRI Chapt. 5 - *Submit* a PDF map from *either* exercise 5-1 or 5-2 and follow the instructions in the ESRI book on what to submit. (**Due May 2**)

Week 6 (week of **May 7): Midterm Exam** during lecture (**No readings or Lecture**)

Week 7 (week of **May 14): Database Management and Tables**

Readings
- ESRI Chapt. 7 - *Submit* a PDF map from *either* exercise 6-1 or 6-2 and follow the instructions in the ESRI book on what to submit. (**Due May 16**)

Lab assignment 2 due (in Lab @9am to TA, *printed*)
Lab assignment 3 handed out 5

Week 8 (week of **May 21**): **Global Positioning Systems and Digital Data**

> Readings
> - Bolstad Chapt 5 (required)
> - ESRI Chapt. 6 - *Submit* a PDF map from *either* exercise 7-1 or 7-2 and follow the instructions in the ESRI book on what to submit (**Due May 23**)

Week 9 (week of **May 28**): **Basic Spatial Analysis for Cluster Pattern and Cluster Detection**

> Readings
> - ESRI Chapt. 8 - *Submit* a PDF map from *either* exercise 8-1 or 8-2 and follow the instructions in the ESRI book on what to submit. (**Due May 30**)

Week 10 (week of **June 4**) **Terrain and Interpolation Analysis and Final Review**
> Readings: Chapt. 9 *Submit* a PDF map from *either* exercise 9-1 or 9-2 and follow the instructions in the ESRI book on what to submit. (**Due June 6**)

> **Lab assignment 3 due** (in Lab @9am to TA, printed)
> **Final Exam (Take home) handed out**

Final Exam (Take home) due Friday June 15 @ 5:00pm.