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 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

Required
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


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, before 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
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.