ENV H 590 B Au 17: Selected Topics

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ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH · UNIVERSITY *of* WASHINGTON

ENV H 590 B: Selected Topics in Environmental Health

GIS in Public Health

3 credits, graded

Instructor:

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DEOHS

Health Sciences Building F-226C

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Office hours available by appointment

Class Time: *Fridays* 12:30-3:20pm

Class Location: Health Sciences Library, Computer Commons, Room C
                        (**http://hsl.uw.edu/topics/learning-commons** (http://hsl.uw.edu/topics/learning-commons))

Course Information:

The goal of this course is to familiarize students with the applications of Geographic Information System (GIS) in Public Health, and to provide students with practical experience using GIS methods to conduct spatial analyses. Lectures, case studies, and hands-on computer lab exercises will highlight the principles, methods, and techniques of spatial analysis to solve practical public health problems within a variety of health sub-disciplines, focusing on environmental health, but also exploring infectious diseases, health services and community health. Topics covered by this course include spatial data representation and

management, visualization of spatial data using traditional GIS-based maps or newer interactive mapping technologies, and exploratory spatial data analyses.

Learning Objectives:

At the end of this course, students should be able to:

- Solve practical Public Health spatial problems using GIS methods
- Differentiate between different spatial object representations, such as raster versus vector data, different map projections and coordinate systems.
- Describe major sources of spatial data used in the Public Health, including those that come from the census, satellite imagery, street address geocoding, global positioning system, and health services
- Critique and produce maps
- Use spatial joins, buffer analyses, spatial overlays and map algebra, basic spatial statistics and cluster analyses.
- Explain the value of GIS, and be able to cite key studies in which GIS was used in environmental health, infectious disease, health services, and community health.
- Communicate the findings of a spatial data analysis.
- Demonstrate competency in technical writing and oral presentation.
- Demonstrate the ability to work effectively and co-operatively as part of a team.

Class Format:

Instruction will consist of 1/3 lecture and 2/3 exercise and project work. Each week will examine a public health topic with lecture, discussion, and readings. The same topic will be explored with a hands-on computer lab exercise, which will provide practical experience with using GIS. The exercises will be done in two-person student teams to allow for peer-learning and teamwork.

In the last 2 weeks of the course, each student (individually, not in teams) will conduct an original GIS analysis final project. The instructor will be available to advise the analysis. In doing this project, students will need to:

1. Identify a real-world public health question or research hypothesis that involves spatial data analysis.
2. Identify and collect spatial data to address their question/hypothesis.
3. Use the methods acquired from the lab exercises to analyze their project data.
4. Write a clear and concise (no more than 5-pages, not including figures & tables) final project report describing 1, 2, 3 above and their findings.
5. Share what they learned from their project with the rest of the class, by presenting a 1-slide oral summary on the last day of class.

6. The final project report will be due on the day after the last class at noon.

Grading:

Lab exercise reports: 50%

Final project report: 35%
Final presentation: 15%

Lab exercise reports will be prepared and submitted to the course website by each team (each student should submit a copy of the lab report to Canvas -- it can be the identical lab report for the team). The reports are due one week after the lab (at noon 12pm). Reports will be graded on the completeness of work, validity of findings, and quality of explanation. Specific questions asked in the lab assignments should be answered in the lab reports. Maps should be of good quality (e.g., with symbol legends, scale bars). The reports should be concise, typed, clearly organized, and submitted on time. 10% of each lab report score will be deducted for each day late.

A final project report should be prepared as described above in class format. The report should have a clear structure (Use these headings: Introduction, Methods, Results, and Discussion, References), using tables and figures judiciously to support and communicate findings. Give credit, when and where credit is due: if you mention other people's data, studies, etc., please be sure to cite it appropriately (see: **http://guides.lib.uw.edu/research/citations/citation-basics** **(http://guides.lib.uw.edu/research/citations/citation-basics)**). Maps should be of good quality (e.g., with symbol legends, scale bars, legible text). The final report should be concise, typed, clearly organized, and submitted on time. 10% of the score will be deducted for each day late.

A final project presentation will consist of a single Powerpoint slide presented in front of class, and 5-minute summary of your main public health question and findings. The presentation will be given a full score if the student gives an oral presentation. If a presentation is not given, the student will receive a score of zero.

Responsibilities:

The student responsibilities for the course are the following:

1. Participate in class discussions.
2. Read the assigned readings.
3. Prepare and submit lab reports on time. The reports should be concise and clearly written.
4. Prepare and submit final project report on time.
5. Prepare and orally present the findings of the project in class.

Academic Integrity *(***http://sph.washington.edu/students/academicintegrity/** **(http://sph.washington.edu/students/academicintegrity/)** *)*

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

*The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington **Student Conduct Code** (WAC 478-120).*

*We expect you to know and follow the university's policies on cheating and plagiarism, and the **SPH Academic Integrity Policy**. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington **Community Standards and Student Conduct** website.*

Access and Accommodation (http://depts.washington.edu/uwdrs/faculty-resources/syllabus-statement/ (http://depts.washington.edu/uwdrs/faculty-resources/syllabus-statement/)):

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

*If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or **uwdrs@uw.edu** (mailto:uwdrs@uw.edu) or **disability.uw.edu** (http://disability.uw.edu/) . DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.*

GIS Software, Texts and Readings:

GIS software

We will be using ESRI ArcGIS. **http://www.esri.com/software/arcgis** (http://www.esri.com/software/arcgis)

You will be able to access this software on the computers in the Health Sciences Library computer lab. You can access the lab outside of class hours, when the library is open and others aren't using the computer lab.

UW maintains a site license for ArcGIS for use on department machines: **https://depts.washington.edu/arcgis/pages/** (https://depts.washington.edu/arcgis/pages/)

Additionally free 1-year student licenses are available for install on Windows PC computers (or Mac's running Windows in a virtual machine). There may also be options to log into "terminal servers" that have ArcGIS installed, as described here: **https://depts.washington.edu/arcgis/pages/arcgis-students** (https://depts.washington.edu/arcgis/pages/arcgis-students)

While our course will focus on ArcGIS, the GIS skills are applicable to other GIS software, some of which

are open source and freely available:

Maptitude (**http://www.caliper.com/** (http://www.caliper.com/))
GRASS (**http://grass.osgeo.org/)**
 (http://grass.osgeo.org/)) QGIS (**http://www.qgis.org/en/site/** (http://www.qgis.org/en/site/))

And increasingly R (**http://www.r-project.org/** (http://www.r-project.org/)) is being used to perform spatial data analyses, with the following useful packages: sp, rgeos

Recommended (<u>but not required</u>) course texts:

Cromley and McLafferty (2011) GIS and Public Health, 2nd Edition, The Guilford Press, New York. (*Pretty much the only overarching GIS textbook that focuses on Public Health that's relatively current. ~$52 used on Amazon*).

Kurland and Gorr (2012) GIS Tutorial for Health: Fourth Edition, ESRI Press, New York. (*An "exercise" oriented book with health services related examples. ~$20 used on Amazon*).

Weekly readings:

In the syllabus calendar below, clicking on each week's lecture calendar event will list readings associated with the lecture topic.

Course Summary:

Date	Details	
Fri Sep 29, 2017	📅 **ENVH590B - Introductions (you, me, the course, the GIS Lab, and someone named John Snow) (https://canvas.uw.edu/calendar? event_id=1058947&include_contexts=course_1117126)**	12:30pm to 3:20pm
Fri Oct 6, 2017	📝 **Exercise 1 (https://canvas.uw.edu/courses/1117126/assignments/3905992)**	due by 12pm
	📅 **ENVH590B - Exploratory Data Analysis, Environmental Health (https://canvas.uw.edu/calendar? event_id=1058944&include_contexts=course_1117126)**	12:30pm to 3:20pm
Fri Oct 13, 2017	📝 **Exercise 2 (https://canvas.uw.edu/courses/1117126/assignments/3905993)**	due by 12pm

	▦ **ENVH590B - Spatial Stats, Infectious Disease** [(https://canvas.uw.edu/calendar? event_id=1058949&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058949&include_contexts=course_1117126)	12:30pm to 3:20pm
Fri Oct 20, 2017	📝 **Exercise 3** [(https://canvas.uw.edu/courses/1117126/assignments/3905994)](https://canvas.uw.edu/courses/1117126/assignments/3905994)	due by 12pm
	▦ **ENVH590B - Community Health and Built Environment** [(https://canvas.uw.edu/calendar? event_id=1058945&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058945&include_contexts=course_1117126)	12:30pm to 3:20pm
Fri Oct 27, 2017	📝 **Exercise 4** [(https://canvas.uw.edu/courses/1117126/assignments/3905995)](https://canvas.uw.edu/courses/1117126/assignments/3905995)	due by 12pm
	▦ **ENVH590B - Healthcare services, Location-Allocation** [(https://canvas.uw.edu/calendar? event_id=1058948&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058948&include_contexts=course_1117126)	12:30pm to 3:20pm
Fri Nov 3, 2017	▦ **ENVH590B (Decide on your final project, find data)** [(https://canvas.uw.edu/calendar? event_id=1058943&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058943&include_contexts=course_1117126)	12:30pm to 3:20pm
	▦ **ENVH590B - GPS and Mobile GIS** [(https://canvas.uw.edu/calendar? event_id=1058946&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058946&include_contexts=course_1117126)	12:30pm to 3:20pm
	📝 **Exercise 5** [(https://canvas.uw.edu/courses/1117126/assignments/3905996)](https://canvas.uw.edu/courses/1117126/assignments/3905996)	due by 12pm
Fri Nov 10, 2017	▦ **ENVH590B (Holiday, but you should be visualizing your data, creating maps for your final project)** [(https://canvas.uw.edu/calendar? event_id=1058942&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058942&include_contexts=course_1117126)	12:30pm to 3:20pm
	📝 **Exercise 6** [(https://canvas.uw.edu/courses/1117126/assignments/3905997)](https://canvas.uw.edu/courses/1117126/assignments/3905997)	due by 12pm
Fri Nov 17, 2017	▦ **ENVH590B (should have good idea of how you'll analyze your data, what questions you'll try and answer, etc. for final project)** [(https://canvas.uw.edu/calendar? event_id=1058941&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058941&include_contexts=course_1117126)	12:30pm to 3:20pm
	▦ **ENVH590B - Spatial Sampling and Spatial Interpolation** [(https://canvas.uw.edu/calendar? event_id=1058940&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058940&include_contexts=course_1117126)	12:30pm to 3:20pm
	📝 **Exercise 7** [(https://canvas.uw.edu/courses/1117126/assignments/3905998)](https://canvas.uw.edu/courses/1117126/assignments/3905998)	due by 12pm
Fri Nov 24, 2017	▦ **ENVH590B (Holiday, but should be finishing final project analyses, writing it up, preparing the presentation)**	

	[(https://canvas.uw.edu/calendar?event_id=1058939&include_contexts=course_1117126)](https://canvas.uw.edu/calendar?event_id=1058939&include_contexts=course_1117126)	12:30pm to 3:20pm
Fri Dec 1, 2017	📅 **ENVH590B (Optional open lab today to work on your final projects) (https://canvas.uw.edu/calendar?event_id=1058937&include_contexts=course_1117126)**	12:30pm to 3:20pm
Fri Dec 8, 2017	📝 **Final Project Presentation (https://canvas.uw.edu/courses/1117126/assignments/3906000)**	due by 12pm
	📅 **ENVH590B - Last day of class (Project presentations) (https://canvas.uw.edu/calendar?event_id=1058938&include_contexts=course_1117126)**	12:30pm to 3:20pm
Sat Dec 9, 2017	📝 **Final Project (https://canvas.uw.edu/courses/1117126/assignments/3905999)**	due by 12pm