Geography 465 – GIS Databases & Programming

Spring 2015 – Smith 401

Ryan Burns Lecture: M/W/F 10:30-11:20

Smith Hall 422 Lab M/W A: 11:30-12:20 B: 1:30-2:20

rlburns@uw.edu Office hours: by appointment only

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“On the one hand, a given information artifact (a classification system, a database, an interface, and so forth) is partially constitutive of some social world. ... On the other hand, any given social world itself generates many interlinked information artifacts. ... Put briefly, information artifacts undergird social worlds, and social worlds undergird these same information resources.” –Bowker & Star, Sorting Things Out(2000, 82)

# I. Course Description

Our everyday lives and environments are more and more mediated by data: we produce it almost constantly (often unwittingly), engage it to make banal decisions (such as, in Seattle, where to get our vegan, organic, free-range, gluten-free “noms”), and are impacted by its analysis (e.g., urban resource/funds distribution). Data do not merely represent the world in which we live, however – they actively construct it. Knowing how and why to interact with that data, and reflecting on interactions’ implications, is therefore of utmost importance to a 21st-century citizen.

In this course we will explore some answers to these provocations. The complex world of geographic data management changes rapidly and substantially, opening exciting opportunities for those who wish to explore geographic patterns and processes. To critically engage data can be empowering, as it expands your analytical, interpretive, and creative skills. Geographers are particularly keen to use this data to learn and communicate information about the world we live in.

Databases are a fundamental technology to traditional GIS, but data management is quickly expanding beyond this approach. In this course we will learn how to develop and interact with databases and database management systems. However, this course will also explore exciting new ways of collecting, interacting with, and representing geographic data, such as web mapping and Big Data. Students will get hands-on experience with Python as the vehicle for data management, and will learn how to program/script both in ESRI’s ArcGIS suite as well as outside of it.

# II. Learning Objectives

-          To learn to critically examine geographic data, both for its underlying social and spatial dynamics, but also to evaluate the most appropriate ways of interacting with it.

-          To learn the fundamental forms of geographic data management, and become familiar with new ways of developing, storing, and representing geographic data, including web-based formats.

-          To learn how to use and evaluate various methods of interacting with spatial databases, including Python, ScraperWiki, and TileMill.

-          To develop advanced conceptual and Python programming/scripting tools necessary to interact with geographic and GIS data across a range of platforms.

# III. Format

This quarter we will be experimenting with a relatively new – yet growing exponentially – approach to learning technology. For this course, I am not the holder of knowledge who imparts it to the students. Instead, I am here to facilitate your own path to learning – it’s a lot less hand-wavey than it sounds: what it means, simply, is that I encourage everyone to think creatively and to turn in something meaningful for you. Similarly, you should not think of your TA as an expert in the practical matters of the material, either; rather, Yanning is a treasure trove of knowledge about how to find answers.

What this means in a practical sense is that (1) you will be graded on labs and individual projects rather than exams; (2) if you can think of a more creative way to answer important questions (or tell an important story) than what you see in the assignments, I encourage you to talk with me about your ideas; (3) I hope to have classroom discussions and problem-solving challenges rather than lectures; (4) there will probably be lots of hiccups, as this is a new approach for all of us! You should also consider this syllabus a living document, subject to frequent and unpredictable change (of course, I’ll notify the class when such changes do occur).

# IV. Textbook

This course will not have a traditional textbook, as much of the learning materials are freely available online. Where they are not, I will upload them to our Canvas site. Please be advised that by accessing some such electronic materials, you indicate you understand they are provided for the purposes of your study within this course and that additional uses may go beyond what is legally sanctioned.

Pilgrim, M. 2004. Dive into Python: http://www.diveintopython.net/

Other resources:

Official Python documentation: https://docs.python.org/2/library/index.html

Downey, Allen. 2015. Think Python: How to Think Like a Computer Scientist: http://www.greenteapress.com/thinkpython/html/index.html

“Python for non-programmers”: https://wiki.python.org/moin/BeginnersGuide/NonProgrammers

# V. Important Notices

**Prepare yourself to succeed in this class:**

Review the syllabus and all assignment instructions regularly. Attend class and participate in discussions regularly. Check your UW email account– this is where I will send any electronic class announcements. When you are confused about course material or expectations – ask questions! Asking questions well in advance of an assignment due date will increase the likelihood that I can help.

**Be responsible class members.**

No surprises here: treat one another with respect. When working with groupmates, understand each others’ time and work limitations, and put in honest effort. Turn off your cell phone during class. Listen to each another. Welcome any guests we may have in class. Be a resource for your classmates. Threatening behavior of any kind will be handled according to the University’s Student Conduct Code: http://www.washington.edu/students/handbook/conduct.html. I tend to be stricter with classroom expectations than many of your other instructors: please arrive to class on time, attendance will be taken, and I will not tolerate disruptive or distractive behavior in class.

**Complete assignments and exams on time.**

To be fair to your classmates who do their work in a timely fashion, unless a documented medical or personal emergency arises, any work turned in late will be penalized 10% of the total score per day that it is late.  That is, 10% for 1 day late, 20% for 2 days, and so on.  Extensions on papers or incompletes will not be granted unless exceptional circumstances require it and prior arrangements have been made. Everyone is expected to take the exams during class time on the day they are scheduled. See me in extreme cases of medical or personal difficulties.

**Be honest.**

Academic dishonesty, including but not limited to plagiarism, cheating, or submitting academic work that has previously been submitted (without citation or previous permission of instruction) will be penalized.  If you have questions about what might constitute a violation of the policy, please see me or review the materials available online at:http://depts.washington.edu/grading/issue1/honesty.htm. Academic dishonesty will be handled according to the University’s Student Conduct Code:http://www.washington.edu/students/handbook/conduct.html. We will have an in-class briefing on how to cite/reference, when to cite/reference, and why to cite/reference.

**Students with special needs**

If you know of any factors in your life that may hinder your ability to learn up to your potential in this course, please let me know.  If these factors are recognized disabilities under the ADA, please register with Disability Resources for Students (DSR) and bring your letter of accommodation to me as soon as possible so that we develop a plan to accommodate your needs. DSR can be contacted at: 448 Schmitz Hall; Phone: 206-543-8924 (V), 206-543-8925 (V/TTY), 206-616-8379 (FAX); or E-mail: uwdss@u.washington.edu

# VI. Assignments and grading

6 labs                                                   120 (20 points each)

Reading summary                                 20

Group project

            Proposal                                    50

            Presentation                              50

            Reflection paper                        70

            Maps/interpretation                   70

Participation                                           20

Total:                                                    400

Final grades for the course will be assigned based upon the following scale:

|  |  |
| --- | --- |
| **Points** | **Grade** |
| 378 – 400 | 4.0-3.9 |
| 356 – 377 | 3.8-3.5 |
| 342 - 352 | 3.4-3.2 |
| 332 – 341 | 3.1-2.9 |
| 306 – 328 | 2.8-2.5 |
| 292 - 305 | 2.4-2.2 |
| **Points** | **Grade** |
| 274 – 288 | 2.1-1.9 |
| 260 – 273 | 1.8-1.5 |
| 245 – 256 | 1.4-1.2 |
| 218 – 244 | 1.1-0.9 |
| 200 - 217 | 0.8-0.7 |
| Below 200 | 0.0 |

# VII. Calendar:

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| **Date/topic** | **Assignments due** | **Notes** | **Readings** |
| **March 30**Big picture stuff (what we’re covering in the course)Intro to GitHub, Python, SQL  | Lab 1 due |   | Crampton's (2010) "Maps 2.0: Map Mashups and New Spatial Media." This is Chapter 3 in Crampton's book, Mapping: A Critical Introduction to Cartography and GIS, available here:[http://bit.ly/1G340oK (Links to an external site.)](http://bit.ly/1G340oK%22%20%5Ct%20%22_blank).Chapters 2-3 from Dive into Python |
| **April 6**GeoprocessingArcPy, Fiona/Shapely | Lab 2 due |   | 1: [A Feminist && A Programmer (Links to an external site.)](http://www.hastac.org/blogs/ari-schlesinger/2013/12/13/feminist-programmer) /[Feminism and Programming Languages (Links to an external site.)](http://www.hastac.org/blogs/ari-schlesinger/2013/11/26/re-feminism-and-programming-languages)2: Chapter 2 (parts [A](https://canvas.uw.edu/courses/980848/files/31106493/download?wrap=1)Preview the documentView in a new window and[B](https://canvas.uw.edu/courses/980848/files/31106495/download?wrap=1)Preview the documentView in a new window) from Kitchin, Dodge -Code/Space------1. [What is ArcPy? (Links to an external site.)](http://arcg.is/1CkaXPP)
2. [Using ArcPy (Links to an external site.)](http://arcg.is/1H3JiWy):
3. [7 Ways to Use Github that Aren't Coding (Links to an external site.)](http://readwrite.com/2013/11/08/seven-ways-to-use-github-that-arent-coding)
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| **April 13**Designing a spatial database | Lab 3 due | Assign groups | 1. [Burns - Moments of Closure](https://canvas.uw.edu/courses/980848/files/31119504/download?wrap=1)Preview the documentView in a new window
2. [Schuurman - Database Ethnographies](https://canvas.uw.edu/courses/980848/files/31174168/download?wrap=1)Preview the documentView in a new window
3. [Thatcher and Dalton - What Does a Critical Data Studies Look Like? (Links to an external site.)](http://bit.ly/1gMNMXa)

----------[Esri Geodatabase architecture (Links to an external site.)](http://resources.arcgis.com/en/help/main/10.2/index.html#//003n000000r4000000) |
| **April 20**AAG week; meet in labs | Lab 4 due | Meet w/group, plan/strategize |   |
| **April 27**Volunteered Geographic Information, the geoweb, and digital humanitarianismHTML, CSS, Javascript | Lab 5 dueProposal due Friday, May 1 |   | 1. [Sui - Angelina Jolie's Tattoo](https://canvas.uw.edu/courses/980848/files/31174349/download?wrap=1)Preview the documentView in a new window
2. [Corbett - I don't come from anywhere](https://canvas.uw.edu/courses/980848/files/31119520/download?wrap=1)Preview the documentView in a new window
3. [Liu and Palen - The New Cartographers](https://canvas.uw.edu/courses/980848/files/31174311/download?wrap=1)Preview the documentView in a new window
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| **May 4**May 9 (Friday) I will be out of townScraping, APIs | Lab 6 due |   | 1. [Zook et al - VGI and Crowdsourcing Disaster Relief](https://canvas.uw.edu/courses/980848/files/31491973/download?wrap=1" \o "zook et al - vgi and crowdsourced disaster relief.pdf)Preview the documentView in a new window
2. [boyd and Crawford - Six Provocations for Big Data.](https://canvas.uw.edu/courses/980848/files/31491975/download?wrap=1)Preview the documentView in a new window
3. [Hsu - Digital Ethnography](https://canvas.uw.edu/courses/980848/files/31491977/download?wrap=1)Preview the documentView in a new window

[Collecting real-time Twitter data with the Streaming API (Links to an external site.)](http://badhessian.org/2012/10/collecting-real-time-twitter-data-with-the-streaming-api/) |
| **May 11**Re-imagining “GIS” databases & data in 2015TileMill, QGIS, Neatline, GeoJSON, Omeka |   | Final project | 1. [Jenny, Jenny, Raber - Map Design for the Internet](https://canvas.uw.edu/courses/980848/files/31598843/download?wrap=1)Preview the documentView in a new window
2. [Zhao - The Geoprocessing Web](https://canvas.uw.edu/courses/980848/files/31598849/download?wrap=1)Preview the documentView in a new window
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| **May 18**Batch, iterative, and textual processing |   | Final project | 1. [Chapter 2 from Elwood -Qualitative GIS](https://canvas.uw.edu/courses/980848/files/31681933/download?wrap=1)Preview the documentView in a new window
2. [Torget et al - Mapping Texts](https://canvas.uw.edu/courses/980848/files/31668789/download?wrap=1)Preview the documentView in a new window
3. [Hardy - The geographic nature of Wikipedia authorship](https://canvas.uw.edu/courses/980848/files/31665730/download?wrap=1)Preview the documentView in a new window
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| **May 25**Returning to ESRI: Advanced data/base manipulation |   | Final project | 1. [Shelton, Poorthuis, Zook - Social Media and the City](https://canvas.uw.edu/courses/980848/files/31119551/download?wrap=1)Preview the documentView in a new window
2. [Gao et al - Constructing Gazetteers from Volunteered Geo-Data Based on Hadoop (ONLY SECTIONS 1, 3, and 4) (Links to an external site.)](http://arxiv.org/ftp/arxiv/papers/1311/1311.7676.pdf)
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| **June 1**Social, political impacts of technologies |   | Final project | 1. G[lasze, Perkins -Social and Political Dimensions of the OpenStreetMap project](https://canvas.uw.edu/courses/980848/files/31106394/download?wrap=1)Preview the documentView in a new window
2. [Thatcher - Data Fumes](https://canvas.uw.edu/courses/980848/files/31119652/download?wrap=1)Preview the documentView in a new window
3. [Stephens - Gender and the Geoweb](https://canvas.uw.edu/courses/980848/files/31822851/download?wrap=1)Preview the documentView in a new window
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| **June 8****8:30-10:20am** | Final “exam”:Presentations, maps, paper due |   |   |