USP 410/510 Urban Informatics

Time: Winter 2023, Mondays 1-3:30pm

Office Hours: Mondays 11:00am - 12:45pm in person URBN 350D/via zoom: **https://pdx.zoom.us/j/5037255130** ⯈

Credits: 3

Modality: Attend Anywhere (In person: OND 202 + zoom: **https://pdx.zoom.us/j/5037255130** ⯈)

Instructor: Dr. Liming Wang (**lmwang@pdx.edu**)

This course introduces urban informatics, an interdisciplinary approach to understanding, managing, and designing the city using systematic theories and methods based on new information technologies. Urban informatics builds on the science and technologies of information processing, information systems, computer science, and statistics to support the quest to develop applications to cities.

In this project-based class, students have an opportunity to develop applications that combine technical skills and domain knowledge and use information processing, analysis, and presentation to support problems solving in cities. It will introduce students to basic coding, data processing and analysis, visualization and mapping.

There are no prerequisites, but it requires some tolerance for experimentation, self-directed trial and error, and an interest in learning to write computer code.

Synopsis and Objectives

This course is designed to provide students with a toolkit of technical skills for quantitative problem solving. Through project-based hands-on learning, the course aims to achieve these objectives for students:

- An introductions of the fundamentals of computer code to automate tasks;
- Familiarity of workflow and project management best practices working with data;
- Developing skills of accessing, cleaning, visualizing, and analyzing urban data;
- Learning to combine quantitative technical skills and domain knowledge to support problem solving in cities

Textbook and Readings

There is no specific textbook for the class. The course will draw on materials from a wide range of sources and will provide students with book excerpts, technical reports, and journal papers as appropriate to supplement lecture notes. The following textbooks are recommended as general references:

- Shi, Goodchild, Batty, Kwan, Zhang (Eds), 2021, Urban Informatics (Available online at **https://link.springer.com/book/10.1007%2F978-981-15-8983-6** ⯈)
- Grolemund, 2014, Hands-On Programming with R: Write Your Own Functions And Simulations. (Available online at **https://rstudio-education.github.io/hopr/** ⯈)
- Grolemund and Wickham, 2017, R for Data Science, O'Reilly. (Available online at **https://r4ds.had.co.nz/** ⯈)
- Tierney, 2020, RMarkdown for Scientists, available at **https://rmd4sci.njtierney.com/rstudio-what-and-why.html** ⯈

Grade

45% of your grade will be from DataCamp exercises (9 exercises x 5 points/per exercise) and 55% from the class project (40% for the final product + 15% for the project presentation). You can choose to finish any 9 DataCamp courses from DataCamp Assignments.

The final product can be in the form of a project report, an infographic, or a dashboard, generated using R and/or RMarkdown. Follow the best practices in creating infographics/dashboard & report. Submit your final product in appropriate (html/pdf/png) format and the accompany RMarkdown file (& R script if any).

Your project presentation will be no more than 20 minutes in length with 5 minutes for Q&A.

Topics and Schedule (Tentative)

Week	Topic	Readings	Assignment/Deadline
W1: 01/09	Overview, Computer Setup, Introduction to R	Shi, **Chapter 1** ⯈ Grolemund2014, **Chapter 2** ⯈	**Intro to R on datacamp** ⯈
W2:	Holiday (MLK		

01/16	day); No class		
W3: 01/23	Workflow & project management	Grolemund2017, Chapter 1, 6, 8	Project idea; **Introduction to the tidyverse** ⤳
W4: 01/30	All about data: Data import/export, cleaning & processing	Grolemund2017, Chapter 5, 9- 14	Project team formation; **Data Manipulation with dplyr on datacamp** ⤳ **Joining Data with dplyr** ⤳
W5: 02/06	Reproducible research/work; RMarkdown	Grolemund2017, Chapter 27- 30 Tierney, 2020	**Reporting with R Markdown** ⤳
W6: 02/13	Exploring and visualizing data	⤳ Grolemund2017, Chapter 3, 7	**Introduction to Data Visualization with ggplot2** ⤳ ⤳
W7: 02/20	Accessing public data from the web and via APIs	**An introduction to tidycensus** ⤳ **Beginner's Guide on Web Scraping in R** ⤳	**Working with web data in R** ⤳ or **Web Scraping in R** ⤳
W8: 02/27	Working with spatial data and maps	**Geocomputation with R** ⤳, Chapter 2 - 4, 9	**Visualizing Geospatial Data in R** ⤳ or **Exploratory Data Analysis in R** ⤳
W9: 03/06	Developing infographics and dashboard	**Ultimate Infographic Design Guide** ⤳ **Dashboard basics** ⤳ **Using flexdashboard** ⤳	**Building Dashboards with flexdashboard** ⤳ or **Building Dashboards with shinydashboard** ⤳
W10: 03/13	Project workshop		
W11: 03/20	Project presentation		
W11: 03/24	Final project report/product submission		

Resources

DataCamp: free registration for students in the class (using your pdx email) with link **https://www.datacamp.com/groups/shared_links/7cebf85d4eee5bb7e27afa8fb2535b641d6009d93f16d9099aa283ca1f7efb0c** ⤳

Important/required syllabi statements and other resources

ACCESS AND INCLUSION FOR STUDENTS WITH DISABILITIES

PSU values diversity and inclusion; My goal is to create a learning environment that is accessible, equitable, inclusive, and welcoming. I am committed to fostering mutual respect and full participation for all students. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. Additionally, the Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment. The DRC works with students who have physical, learning, cognitive, mental health, sensory, chronic illness, and other disabilities.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations.

If you already have accommodations, please contact me to make sure that I have received your DRC Faculty Notification Email so we can discuss your accommodations.

The DRC is located in 116 Smith Memorial Student Union, Suite 116. You can also contact the DRC at 503-725-4150 or, drc@pdx.edu. Visit the DRC online at https://www.pdx.edu/disability-resource-center.

Title IX support and resources

Portland State is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment (sexual assault, domestic and dating violence, and gender or sex-based harassment and stalking). If you have experienced any form of gender or sex-based discrimination or sexual harassment, know that help and support are available. Information about PSU's support services on campus, including confidential services and reporting options, can be found on PSU's Sexual Misconduct Prevention and Response website at: http://www.pdx.edu/sexual-assault/get-help or you may call a confidential IPV Advocate at 503-725-5672 or schedule Online at https://psuwrc.youcanbook.me . You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to:

- PSU's Title IX Coordinator: Julie Caron by calling 503-725-4410, via email at titleixcoordinator@pdx.edu or in person at Richard and Maureen Neuberger Center (RMNC), 1600 SW 4th Ave, Suite 830
- Deputy Title IX Coordinator: Yesenia Gutierrez by calling 503-725-4413, via email at yesenia.gutierrez.gdi@pdx.edu or in person at RMNC, 1600 SW 4th Ave, Suite 830

Please be aware that all PSU faculty members and instructors are required to report information of an incident that may constitute prohibited discrimination, including sexual harassment and sexual violence. This means that if you tell me about a situation of sexual harassment or sexual violence that may have violated university policy or student code of conduct, I have to share the information with my supervisor, the University's Title IX Coordinator or the Office of the Dean of Student Life. However, the Title IX Coordinators will keep the information confidential and refer you to a confidential advocate. For more information about Title IX please complete the required student module Creating a Safe Campus in your D2L.

Classroom Requirements for All Students and Faculty Due to Covid-19

The University has established rules and policies to make the return to the classroom as safe as possible. It is required for everyone to follow all the Return to Campus rules and policies. To participate in this class, PSU requires students to comply with the following.

Masks Required at all Times in Classroom

Wear a mask or face covering indoors at all times. Your mask or face covering must be properly worn (fully covering nose and mouth and tight fitting). Mesh masks, face shields, or face covering that incorporates a valve designed to facilitate easy exhalation are not acceptable. Because a mask must be worn in the classroom, there should be no eating or drinking in the classroom. If you have a medical condition or a disability that prevents you from wearing a mask or cloth face covering, you must obtain an accommodation from the Disability Resource Center (DRC) to be exempt from this requirement.

CDC, State, and County guidance does not limit class size for in-person instruction or require physical distancing.

Vaccination

Be vaccinated against COVID-19 and complete the COVID-19 vaccination attestation form. Those students with medical or nonmedical exemptions or who will not be on campus at all must complete the process described on "COVID-19 Vaccine Exemption Request Form" to establish those exemptions.

Health Check, Illness, Exposure or Positive Test for COVID-19

Complete the required self-check for COVID-19 symptoms before coming to campus each day.

If you are feeling sick or have been exposed to COVID-19, do not come to campus. Call SHAC to discuss your symptoms and situation (503.725.2800). They will advise you on testing, quarantine, and when you can return to campus.

If you test positive for COVID-19, report your result to SHAC and do not come to campus. SHAC will advise you on quarantine, notification of close contacts and when you can return to campus.

Please notify me, (i.e. your instructor), should you need to miss a class period for any of these reasons so that we can discuss strategies to support your learning during this time.

If I become ill or need to quarantine during the term, either I or the department chair will notify you via PSU email about my absence and how course instruction will continue.

Failure to Comply with Any of these Rules

As the instructor of this course, the University has given me the authority to require your compliance with these policies. If you do not comply with these requirements, I may ask you to leave the classroom or I may need to cancel the class session entirely.

In addition, failure to comply with these requirements may result in a referral to the Office of the Dean of Student Life to consider charges under PSU's Code of Conduct. A student found to have violated a university rule (or rules) through the due process of student conduct might face disciplinary and educational sanctions (or consequences). For a complete list of sanctions, see Section 14 of the Student Code of Conduct & Responsibility

Guidance May Change

Please note that the University rules, policies, and guidance may change at any time at the direction of the CDC, State, or County requirements. Please review the University's main COVID-19 Response webpage and look for emails from the University on these topics.