ESM 333/334 – Methods of data collection, analysis, representation, and modeling in Environmental and Social Sciences

Winter 2022 Syllabus
Lectures: MW 11:30 am – 1:20 pm in SB1 Rm. 424
Lab: 2:00 pm – 3:50 pm in SB1 Rm. 424
Slack Channel: https://join.slack.com/t/esm333-334winter2022/shared_invite/zt-10q5u0f6v-6dNS3ATycKTMTYaaG_7Pew

Instructor: Brian C. Turner, Ph.D.
Contact info: bcturner@pdx.edu
Office Hours: Friday 1pm-3pm and by appointment
Zoom Link: https://pdx.zoom.us/my/dr.b.zoom.office

Teaching Assistant: Tapiwa Chabikwa
Contact Info: chabikwa@pdx.edu

COVID-19

Please note the content outlined below is for an ideal situation. Due dates, course content, or any other aspect of the course may be subject to change as the situation evolves. If these changes occur, you will be notified via email and it will be announced on the course Canvas page. If you have any questions or concerns at any time, please do not hesitate to contact the instructor. Additionally, masks are required for all in-person class meetings, and no eating or drinking is allowed in the classroom. Masks must cover face and nose.

If at any time during the course you feel unable to attend class, either due to illness, high anxiety, or other reasons, please stay home. The class is designed to accommodate absences (even the instructor). If you feel this will be a consistent issue throughout the course, please contact the instructor so arrangements can be made.

Course Overview

Environmental data is an important part of our daily lives. We use environmental data to make decisions at the daily, personal level (carry an umbrella, snow conditions for skiing) to policy decisions at the national and global scales (Kyoto Protocol). In this class we peek under the hood and look at the methods and tools that are used to transform environmental data into information that drives our decisions - big and small. The lab associated with the class will give you hand-on experience with some of the tools and methods; while the final project for the class will give you an opportunity to put these skills to practical use by following data through its lifecycle from collection, analysis, representation, modeling, and communication of results.

Learning Goals

1) Understand the methods and tools used to transform data into information.
2) Be able to effectively communicate and critique environmental information.
3) Be able to showcase personal understanding of the environmental data life cycle through a project.
4) Be able to explore and discuss ethical and/or political issues relating to environmental data in a constructive manner.

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Instructor Inclusivity Statement
It is my intent that students from all backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. But there is always room for improvement. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, please let me know of any religious or other events that may conflict with any of our class meetings this term so that we can make arrangements for you.

Land Acknowledgement
"The Portland Metro area rests on traditional village sites of the Multnomah, Wasco, Cowlitz, Kathlamet, Clackamas, Bands of Chinook, Tualatin, Kalapuya, Molalla, and many other tribes who made their homes along the Columbia River creating communities and summer encampments to harvest and use the plentiful natural resources of the area" (Portland Indian Leaders Roundtable, 2018). I am currently on the traditional lands of the Cowlitz and Clackamas and I would like to take a moment to honor these caretakers of the past, present, and future. I am currently working to learn more about the tribes whose land I am living on and I encourage you to do so as well. You can find out which territory you are currently residing on by checking https://native-land.ca/.

Technology
This course focuses heavily on the use of the R programming language. As such, access to a computer outside of lab is essential. ***Please note a phone, tablet, or other similar device is not equivalent***. Additionally, Chromebook computers cannot run R. If you require access to a computer for use outside of class, please contact the instructor for assistance.

Text/Readings
The free online textbook R for Data Science by Garrett Grolemund and Hadley Wickham is required reference for this course, and is available at, https://r4ds.had.co.nz/. Another great online resource is The Handbook of Biological Statistics by John H. MacDonald at http://www.biostathandbook.com/. Other readings and materials will be posted to D2L.

Course Expectations:

- *Ask questions*: If something is unclear, please ask and we will try to clarify. Ask your classmates, ask the TA, or ask the instructor.
- *Be respectful*: Please be respectful of the shared space and of other people as you interact with them online or in-person. Being respectful means not only approaching discussions and interactions in a responsible and thoughtful manner, but it also refers to being respectful of everyone's time by turning in assignments and participating in discussions in a timely manner. Adhere to the code of conduct: http://www.pdx.edu/dos/codeofconduct
- *Attend or Watch Lectures:* You cannot learn if you do not participate. Students are expected to attend lecture or watch the posted recordings (all lectures will be recorded

and posted to the course Canvas page). These lectures also count towards your participation grade.

- *Turn in work on time:* While we will be flexible and accommodating to late work given the current situation, falling behind in your work will make it difficult to keep up with the course. Also, keep in mind that all work must be submitted no later than 11:59pm on 3/18/2022 to receive credit.
- *Make mistakes*: Mistakes are NOT a waste of time. Mistakes mean you are trying and by fixing the mistakes you are persevering and learning.

Miscellaneous:

- When emailing me, please include the course, your last name and a clue about your purpose in the subject line (for example, if you were writing with a question about an assignment, you might write, "ESM 333: Smith week 5 assignment question" in the subject line).
- I am always happy to help fix coding problems but be sure to send me a copy of your R script so I can check and modify the code to help solve the problem.
- Unless otherwise stated, all work is due by Sunday at 11:59 pm of the week it is assigned.
- Plagiarism is a form of academic dishonesty. If a student is found to have used someone else's writing, ideas, or other work without crediting it, they will receive a zero on the assignment. Please consult the Purdue OWL regarding plagiarism and other writing issues: https://owl.english.purdue.edu/owl/resource/589/01/

Assignments & Projects

There are two grades for this class. Each grade is independent of the other, so keep your grade in one does not directly affect the other.

1) *ESM 333, the lecture portion of the class. This grade will be based on the following:*

   Participation - *10% of ESM 333 grade*

   - Attend class or watch recorded lectures. Keep up with tasks. Communicate with the instructor if problems arise. In general, just be involved in the course.

   R Scavenger Hunts - *10% of ESM 333 grade*

   - Eight weekly activities to hone your ability to find and correct common errors in R.

   Managed Project Activities - *25% of ESM 333 grade*

   - You will be assigned five activities centered around examining a dataset assigned by the instructor. These assignments are designed to serve as practice for components of the research project.

   Research Project Activities - *20% of ESM 333 grade*

   - You will be assigned four activities centered around creating and answering a research question based on an existing dataset. These assignments are designed to serve as building blocks for final the research project.

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Research Chat - *5% of ESM 333 grade*

- Participate in the informal conversation among class participants. Will discuss challenges, solutions and generally talk over the experience of the research project. Will occur on 3/7/2022, and can be attended via Zoom.

Research Project Report - *30% of ESM 333 grade*

- The final assignment will consist of the Research Project working with environmental data set(s). Consists of a final individual report.

2) *ESM 334, the lab portion of the class. This grade will be based on lab assignments, each worth 10% of the final ESM 334 grade, and participation. All labs are due by Sunday at 11:59 pm the week they are assigned.*

Course Schedule: Please be aware dates and content may change

Week	Lecture Topics	Lab Date	Lab Topic	Assignment Due Date	Assignments Due
1	Data Science Intro and Finding Data	1/3/2022	Introduction to R	1/9/2022	• Managed Project Activity 1 • R Scavenger Hunt 1 • Lab 1
2	Developing a Research Question	1/10/2022	Exploring and Cleaning Data	1/16/2022	• Research Project Activity 1 • R Scavenger Hunt 2 • Lab 2
3	Manipulating Data	1/17/2022	Manipulating data using dplyr	1/23/2022	• Managed Project Activity 2 • R Scavenger Hunt 3 • Lab 3
4	Making Charts	1/24/2022	Making charts using ggplot2	1/30/2022	• Managed Project Activity 3 • R Scavenger Hunt 4 • Lab 4
5	The Art of Charts	1/31/2022	Advanced use of ggplot2	2/6/2022	• Research Project Activity 2 • R Scavenger Hunt 5 • Lab 5
6	Preparation for Statistical Tests	2/7/2022	Preparation for statistical tests	2/13/2022	• Research Project Activity 3 • R Scavenger Hunt 6 • Lab 6
7	Performing Statistical Tests	2/14/2022	Performing statistical tests	2/20/2022	• Managed Project Activity 4 • R Scavenger Hunt 7 • Lab 7

8	Maps, Spatial Data and Data Ethics	2/21/2022	Making maps using leaflet	2/27/2022	• Research Project Activity 4 • R Scavenger Hunt 8 • Lab 8
9	Presenting Data	2/28/2022	Making reports using Markdown	3/6/2022	• Managed Project Activity 5 • Lab 9
10	Research Project Chat; Work on Project	3/7/2022	Work on Research Project	3/13/2022	• Lab 10
11	Finals Week			3/17/2021	Final Research Project

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.

General student information:

ESM department and School of Environment webpages:
http://www.pdx.edu/esm/ and http://www.pdx.edu/environment/

Advising & Career Services: https://www.pdx.edu/careers/ and
https://www.pdx.edu/careers/what-can-i-do-degree-environmental-studiesenvironmentalsciences

Library Research Tutorials: http://guides.library.pdx.edu/home/howto and
http://guides.library.pdx.edu/biology

Safe Campus: If you have not done so already, please complete the Safe Campus Module in D2L. The module should take approximately 30 to 40 minutes to complete and contains important information and resources. If you are uncomfortable completing the module, please send an email to saveact@pdx.edu to request an exemption. If you or someone you know has been harassed or assaulted, you can find the appropriate resources at Sexual Misconduct Prevention & Response: www.pdx.edu/sexual-assault/. PSU's Student Code of Conduct makes it

clear that violence and harassment based on sex and gender are strictly prohibited and offenses are subject to the full realm of sanctions, up to and including suspension and expulsion. http://www.pdx.edu/sexual-assault/safe-campus-module

Learning Center/Free Tutoring: http://www.pdx.edu/tutoring/ or PSU library Room 245

Writing Center: Help with class assignments, resumes, etc. http://www.writingcenter.pdx.edu/ Cramer Room 188. Please consult the Purdue OWL regarding plagiarism and other writing issues: https://owl.english.purdue.edu/owl/resource/589/01/

Math Help: https://www.pdx.edu/math/math-resource-lab; Department of Mathematics and Statistics provides free tutors for lower division algebra, calculus and statistics: https://www.pdx.edu/math/resources

Disability Resource Center: If you are a student with a documented disability and are registered with the Disability Resource Center, please contact me so that we can arrange whatever academic accommodations you need.

Veterans: If you are a Veteran and have questions about University services or need assistance with your transition from military to campus life, please contact Chris Goodrich, Coordinator of Veterans Services at the Office of Veterans' Services, SMSU room 425.

Multicultural Centers: https://www.pdx.edu/dmss/multicultural-student-center
https://www.pdx.edu/dmss/native-american-student-community-center
https://www.pdx.edu/dmss/la-casa-latina-student-center

Queer Resource Center: www.pdx.edu/queer

Undergraduate Students:

See the ESM www site for scholarship opportunities.

LSAMP (Louise Stokes Alliance for Minority Participation) is dedicated to enhancing the undergraduate experience for underrepresented students in Science, Technology, Engineering, and Mathematics. Funded by the National Science Foundation, our LSAMP program focuses on: Creating a community among LSAMP scholars that values excellence, diversity, and persistence; and Expanding opportunities for LSAMP scholars through participation in undergraduate research experiences and leadership initiatives. If you are interested in finding out more, visit our LSAMP center in 103 Epler Hall, talk to ESM-LSAMP faculty advisory member Cat de Rivera <derivera@pdx.edu>, SRTC 238e, or check out: http://www.pdx.edu/lsamp/home

McNair Fellows program - for first-generation to college students as well as students from backgrounds underrepresented in the sciences.

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