Contact Information

ESM 333 (4 credits) Mon & Wed 11:30 AM – 1:20 PM (Vernier Science Center 306)

Instructor: Dr. Paola López-Duarte
Email: plopezd@pdx.edu
Office hours: Mondays 2:30 - 3:30 PM, Wednesdays 10 - 11 am
Office: SRTC 332 (or request a zoom call: https://pdx.zoom.us/my/plopezd)

ESM 334 (2 credits) Wednesday 2:00 – 3:50 PM (Vernier Science Center B1-09)

Teaching Assistant: Anton Surunis
Email: asurunis@pdx.edu
Office hours: Mondays 2 - 3 pm
Zoom link (or email Anton if you prefer to meet in person in SRTC 166)

Course Overview

The overall goal of ESM 333 and ESM 334 is to provide students with a conceptual understanding of data visualization and data analysis techniques. In lecture (ESM 333), we introduce topics of data exploration, statistical inference, hypothesis testing, and experimental design as they relate to the observation of environmental phenomena. Students develop an understanding of statistical principles and ideas, learn how to carry out many of the most fundamental types of statistical analyses, as well as interpret and share results. In the lab (ESM 334), we use R, an open source programming language and environment for statistics and graphing, to work with different datasets, summarize and plot data, perform statistical tests, and interpret results. We use R in an effort to provide students with the tools they will need to improve reproducibility and collaboration throughout their careers.

Course Format

Both the lecture (ESM 333) and the laboratory (ESM 334) portions of this course will be delivered in person. Class materials, including lecture slides, homework, and project instructions are available and accessible through the ESM 333 Canvas site. All assignments will be submitted on this Canvas site. Please note that you also have access to the ESM 334 Canvas site to view your attendance grade, but no additional information will be available on that site.

Expectations

- ***Make mistakes.*** Mistakes are NOT a waste of time. Mistakes mean you are trying and by fixing the mistakes you are persevering and learning. Learning a statistical language like R is not unlike learning any other foreign language.

- ***Ask questions***. If something is unclear, please ask and we will try to clarify. Ask your classmates, ask the TA, or ask the instructor. But also be prepared to answer your own questions. Think of data analysis and R as a puzzle.

- ***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.

- ***Participate.*** Asking questions, taking notes, and actively listening in lecture and lab will enhance your learning. Participation is 20% of your ESM 333 and 20% of your ESM 334 and we take attendance within the first 15 min of class/lab. It is important that you come to class, work through the in-class exercises, take full advantage of being part of this learning community, and make connections with your instructors and peers. You have a big incentive to be in class and lab!

- ***Turn in work on time.*** While we can be flexible and accommodating to late work, falling behind in your work will make it very difficult to keep up with the course. Most of the new concepts and skills you will learn build up over time so keeping up with your work is key to successfully completing these courses.

- ***Turn in your own work.*** Plagiarism is a form of academic dishonesty. All assignments for this course are open notes/book/internet. However, the work you turn in must be your own. 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.

Technology

- This class uses multiple digital tools (primarily RStudio) so you'll need to have your laptop with you for every class meeting. This will ensure that you can fully participate in all practice activities and collaborative assignments. RStudio can be installed on PCs and Macs. If you have a Chromebook or a tablet, you will likely need to use the virtual desktop (vlab.pdx.edu) to access RStudio. If you need a machine for class, you can borrow one for the term from the PSU library. Availability is limited so please reserve one now if you need it.

Communication

- We will rely on Canvas announcements to keep you updated about any changes or new information you need to know so please make sure you set your **Canvas --> Account --> Notifications --> Announcement** settings to receive immediate notifications.

- When emailing Dr. L or Anton, please include your last name and the reason for emailing in the subject line. For example, if you were writing with a question about an assignment, you might write, "ESM 333: Gomez lab 5 assignment question" in the subject line.

- Unless otherwise stated, all work is due by 11:59 pm on the day it is due (See *Course Schedule*). Please do not wait until the weekend to start your assignments. We are available to answer your questions during the week but cannot guarantee that we will be able to respond to your questions on time if you email us Saturday/Sunday.

Preferred Gender Pronoun

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun and/or the pronunciation of your name.

Student Support

Please learn about and use the many campus resources available to you via PSU's I Am A Student website. These resources are made possible by your tuition and fees. You can also visit the Student Health and Counseling (SHAC) Emergency & Crisis Resources website for a comprehensive list of culturally specific crisis service options. If you are unsure about where to go for help, please reach out to Dr. L or Wendy. We will do our best to help you navigate these resources.

Textbooks

You are not required to buy any textbooks for learning R. There are several books available for free online and are essential references for learning R that will be referenced in class.

Course Schedule

Week	Lecture Materials (available on Sundays)	Lab Instructions (available on Wednesdays)	Assignments (Due Dates)
W1	Introduction to Data Analysis and Visualization	Lab 1. Introduction to Basic R	Lab 1 (Jan 14)
W2	Examining Data with Basic R	Lab 2. Data Manipulation in R	MP 1 (Jan 19) Lab 2 (Jan 21)
W3	Manipulating data with R Packages: dplyr	Lab 3. Graphing in R	RP 1 (Jan 26) Lab 3 (Jan 28)
W4	Data visualization with R Packages: ggplot2; Spatial Data & Mapping in R	Lab 4. Mapping in R	MP 2 (Feb 2) Lab 4 (Feb 4)
W5	Introduction to Statistics R Markdown	Lab 5. R Markdown	RP 2 (Feb 9) Lab 5 (Feb 11)
W6	Statistical Tests (Part I): Chi-Square, t-test, and ANOVA	Lab 6. Statistics Part I	Lab 6 (Feb18)
W7	Statistical Tests (Part II): Correlation, Linear Regression, and Logistic Regression.	Lab 7. Statistics Part II	MP 3 (Feb 23) Lab 7 (Feb 25)
W8	Presenting Results	Lab 8. Statistical Tests Project	RP 3 (Mar 2) Lab 8 (Mar 11)
W9	Work Sessions (Moss and Research projects)	NO LAB (or make up lab)	MP 4 (Mar 9)
W10	Student Project Presentations (RP 4)	NO LAB	Lab 8 (Mar 11)
--	Finals week - NO CLASS	Finals Week - NO LAB	RP 5 (Mar 20)

Grading Criteria

A 93.00-100.00| **A-** 90.00-92.99| **B+** 87.00-89.99| **B** 83.00-86.99| **B-** 80.00-82.99| **C+** 77.00-79.99| **C** 73.00-76.99| **C-**: 70.00-72.99| **D+** 67.00-69.99| **D** 63.00-66.99| **D-**: 60.00-62.99| **F** 00.00-59.99

The grade breakdown is based on PSU's Grading Scale. The course is divided into ESM 333 and ESM 334. ESM 334 is the lab and is graded separately. Doing the labs is critical to your success in the core class.

Lecture (ESM 333, 4 credits)

> **Participation (20%)**. Attend the class. Keep up with tasks. Communicate with the instructor if problems arise.
>
> **Managed Project Activities (35%).** You will be assigned four 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 (45%).** You will be assigned five activities centered around creating and answering a research question based on an existing dataset. These assignments are designed to serve as building blocks for the final research project.

Lab (ESM 334, 2 credits)

> **Participation (20%).** Attend the lab. Keep up with tasks. Communicate with the TA if problems arise.
>
> **Lab Assignments (80%).** Each lab assignment is worth 10% of the final ESM 334 grade.

Late Work

Assignments that are submitted late will receive a 5% deduction for every day. We cannot accept late submissions once we have posted the solutions for said assignments.

Syllabus Revisions

Sometimes it will be necessary or important to update course goals, assignment guidelines, and submission deadlines. This typically occurs from things like unexpected weather events or other stressors that impact our productivity. Sometimes we decide as a class to slow down on an assignment or even cut an assignment out. Anytime this happens, we will discuss this as a class, and I will update the syllabus so you can continue to use it as a reference. Notice of such changes will be announced in our Canvas site and the most updated version of the syllabus will be posted on the Syllabus page.