PSY-GS 8875 | Behavioral Data Science

Spring 2024

Updated 20.01.2024

This is a *living* document. Updates may occur during the semester.
You will be notified of any changes and receive an amended syllabus when changes occur.

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I. Course Information

Class Times: Wednesday, 12:10-3:10pm

Classroom: Hobbs Hall, Room 100A

Instructor: Alexander Christensen (he/him/his)

Office Hours: alexander.christensen@vanderbilt.edu

GitHub: https://github.com/AlexChristensen/PSY-GS-8875_Behavioral-Data-Science

II. Course Description

This course is a broad survey of the fundamentals of data science for the behavioral and social sciences. Application-focused data science for social scientists. Emphasis on open science and reproducible code, effective data management and visualization, application of machine learning and predictive modeling (e.g., classification, regression, regularization, neural networks), unsupervised learning (e.g., k-means clustering, exploratory graph analysis), and cross-validation for generalizability. Experience with R is helpful but not necessary.

III. Course Objectives

In successfully completing this course you will:

- Apply tools from data science in your research
- Learn to select, apply, and interpret predictive models

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- Deploy reproducible and generalizable code and scripts

IV. Prerequisites

A graduate-level course in regression (PSY-GS 8870 or equivalent based on instructor's discretion).

V. Tentative Course Schedule

This is your one-stop guide to this course.

Content, activities, and due dates are subject to change based on progress through the materials. We will cover, if only briefly, all content but time constraints may limit coverage of certain topics in favor of other topics.

VI. Course Materials

All books necessary for the course are provided in "books" sheet the schedule (see VI. Tentative Course Schedule). Additional resources such as videos related to course topics are also provided.

VII. Grading

There will be 12 activities and 1 final project throughout the semester. Only your 10 best activity grades will count toward your final grade. Activities are due the next Tuesday before class at 11:59:59pm.

Activities: 10 activities (14 points each; 70% of your final grade)
Final Project: 1 project (60 points; 30% of your final grade)

Grading Scale (rounded to the nearest percentage):

A	94-100%	B	83-86%	C	73-76%	D	63-66%
A-	90-93%	B-	80-82%	C-	70-72%	D-	60-62%
B+	87-89%	C+	77-79%	D+	67-69%	F	<60%

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Late Work Policy

Activities turned in a second after 11:59:59pm on the Tuesday an activity was due (i.e., Wednesday, 12:00:00am according to Brightspace) will be considered late. Late work will be worth 80% of your overall grade for the activity. You will have **one week** to turn in your activity late after its due date (i.e., until 11:59:59pm, according to Brightspace, on the next Tuesday).

Brightspace and Technology Errors

If working up to the last minute of a deadline, **submit** whatever you have to Brightspace at least **fifteen** minutes before the deadline. Technological errors happen. If Brightspace is not cooperating, send me an email (alexander.christensen@vanderbilt.edu) with an image depicting the issue and **include a timestamp**. Claims of technological errors without substantial evidence will not be considered. Evidence of a technological error sent *after* a deadline will **not** be considered. If a technological error happens more than once, then we will set up a one-on-one meeting to determine the source of the error.

VIII. Grade Appeal Policy

There will be no grade haggling at the end of the semester. Any grade appeals are subject to the conditions below. General, non-specific grade haggling will not be entertained, and I will send an email directly linked to this portion of the syllabus.

The instructor makes all final decisions on grades. The instructor is willing to revisit a grade only in the instance of a **suspected error**. Do **not** request an appeal based on a disagreement with the instructor's judgment. If you disagree with a grade that you've received on an activity or project, then you are welcome to formally submit an appeal to Dr. Christensen. The appeal should be submitted via email (alexander.christensen@vanderbilt.edu) and must include: (1) The subject header "Formal Grade Appeal", (2) clear and specific reference to the part of the activity or project in question, and (3) justification for why more credit is earned, citing specific material or evidence. The appeal should be no later than **7 days** after the grade has been posted on Brightspace.

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IX. Vanderbilt Honor Code

In accordance with the Vanderbilt University Honor Code:

I pledge to pursue all academic endeavors with honor and integrity. I understand the principles of the Honor System, and I promise to uphold these standards by adhering to the Honor Code in order to preserve the integrity of Vanderbilt University and its individual members.

In addition, I abide by the responsibility detailed in the Vanderbilt's Faculty Guide to the Honor System. In general, this course is intended to be collaborative and therefore students may and should work together on activities and projects. Each activity and project, however, must be a student's own work and submitted separately (unless otherwise noted).

By enrolling and continuing to be enrolled in this course, you are agreeing to "pledge on your honor that you have neither given nor received unauthorized aid on the activities and final project."

Artificial Intelligence

Data science is at the forefront of the AI revolution. As teachers, especially of data science, we cannot ignore the impact of AI. As an applied data science course, AI is not only encouraged but a featured of the course. You can and *should* use AI to aid you in your coursework. Stuck on code? Use AI. Want clarity on a concept? Use AI. This syllabus? We'll demo how to access all of its information with AI. Because the use of AI is expected, you do not need to declare that you've used it.

X. Classroom Accommodations

Vanderbilt University and Dr. Christensen are committed to equal opportunity for students with disabilities. If you need course accommodations due to a disability, please contact VU Student Access Services to initiate the process. After SAS has notified me of relevant accommodations,

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we will discuss how these accommodations may best be approached in this class, and I will facilitate the accommodations.

If emergencies or extenuating circumstances keep you from class, please get notes and announcements from a classmate. You're welcome to arrange a meeting with Dr. Christensen to ask questions about the missed material (also check the class's Brightspace).

XI. Mental Health & Wellness

If you are experiencing undue stress that may be interfering with your ability to perform academically, Vanderbilt's Student Care Network offers a range of support services. The Office of Student Care Coordination (OSCC) is the central and first point of contact to help you navigate and connect to appropriate resources. You can schedule an appointment with the OSCC at https://www.vanderbilt.edu/carecoordination/ or call 615-343-WELL. You can find a calendar of services at https://www.vanderbilt.edu/studentcarenetwork/satellite-services/. If you or someone you know needs to speak with a professional counselor immediately, the University Counseling Center offers Urgent Care Counseling. Students should call the UCC at (615) 322-2571 during office hours to speak with an urgent care clinician. You can also reach an on-call counselor after hours or on the weekends by calling (615) 322-2571 and pressing option 2 at any time. You can find additional information at https://www.vanderbilt.edu/ucc/.

XII. Names and Pronouns

If you would like to use a different name or different pronouns than those provided through YES, please let me know at any time prior to or during the semester. Information is available through the LGBTQI Life offices about how to change either or both in YES.

XIII. Religious Holidays

If you will miss class to observe a religious holiday, please email Dr. Christensen in advance of your planned absence. You may make up (without penalty) any work missed due to the observance of a religious holiday. Please let Dr. Christensen know two weeks prior to the

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observance so he can make proper arrangements for you. Dr. Christensen has done his best to organize his class schedule around observances outlined here but please let him know if any observances are not listed that apply to you.

XIV. Mandatory Reporter Obligations

All University faculty and administrators are mandatory reporters. What this means is that all faculty, including me, must report allegations of sexual misconduct and intimate partner violence to the Title IX Coordinator. In addition, all faculty are obligated to report any allegations of discrimination. I am willing to discuss with you such incidents but can only do so in the context of us both understanding my reporting obligations. If you want to talk with someone in confidence, officials in the Student Health Center, the University Counseling Center, and the Office of the Chaplain and Religious Life (when acting as clergy) can maintain confidentiality. In addition, officials in the Project Safe Center have limited confidentiality, in that they must report the incidents but can do so without providing identifying information. The Project Safe Center serves as the central resource for those impacted by sexual misconduct and intimate partner violence and can assist with navigating all facets of the University's resource and support network and other processes.

XV. Class Technology Policy

Please turn the volume off of ALL electronic devices—cell phones, laptops, tablets, etc.—before you come to class. It can be quite distracting to fellow students and to your instructor if your device starts to play music in the middle of class. A computer is a fundamental part of the course and will be required as part of in-class code examples.

XVI. In-class Policy

In alignment with Vanderbilt's academic mission, on-campus academic programs were designed for in-person instruction because it offers an important opportunity for learning, leadership, and the scholarly exchange of ideas. As such, university policy generally requires in-person teaching for undergraduate, professional, and graduate courses (excluding our online programs designed

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for distance learning). Dr. Christensen will not offer remote or online options unless otherwise mandated by Vanderbilt.

XVII. Terms and Agreement

This syllabus is a contract between you, me, and the rest of the class. I acknowledge and agree to all terms written in this document. By taking this course and continuing to be enrolled in this course, you also agree to all terms written in this document. Failure to read this document does not grant privilege to ignore what is written in it.

XVIII. Resources

Beyond the resources provided in the course schedule (see V. Tentative Course Schedule), there are many other resources available to you.

Vanderbilt Library (free): access to R books, R resources, and free R workshops
Posit (RStudio) primer courses (free): basics of {tidyverse}
DataCamp (costs money): many, many R courses in data science
The Software Carpentries (free): courses on programming with R and R for reproducible scientific analysis
R ladies in Nashville offers meetup opportunities to promote gender diversity in the R community
Coursera: machine learning specialization

XIV. Data

Social Sciences

Inter-university Consortium for Political and Social Research (ICPSR): https://www.openicpsr.org/openicpsr/
Open Psychometrics: https://openpsychometrics.org/_rawdata/
Journal of Open Psychology Data: https://openpsychologydata.metajnl.com/
Open Science Framework: https://osf.io/search/

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General

Kaggle datasets: https://www.kaggle.com/datasets

UCI Machine Learning Repository: https://archive-beta.ics.uci.edu/ml/datasets

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