Introduction to Exploratory Data Analysis

Basic Course Information

Class number: 1237 (Section 01) & 1238 (Section 02)
Units: 3 units
Lecture Time: Section 01: MWF, 11:00 – 11:50 am; Section 02: 12:00 – 12:50 pm
Lecture Location: Keck Center 156
Course Canvas Sites:

- Section 01: https://canvas.chapman.edu/courses/34433
- Section 02: https://canvas.chapman.edu/courses/34437

Course Info Repository: https://github.com/CPSC292-Fall2021/CPSC292-CourseInfo
Course Slack Channel: Click here to join

Course Description: Students will learn the fundamentals of data processing and exploratory data analysis using a statistical computing language such as R. Emphasis will be placed on data cleaning, data visualization, and simple statistical analyses. (Offered every year.) 3 credits.

About the lecture: Builds basic skills in data analysis, visualization, and communication using the *R* programming language.

Instructor Information

Instructor: Lindsay Waldrop, Ph.D.
Email address: waldrop@chapman.edu
Office Phone: (714) 516-5615
Office Location: 268 Keck
Office Hours: Tuesdays 9 – 11 am, Fridays 2 – 3 pm, and by appointment (in person or on Zoom: https://chapman.zoom.us/j/6794112215). (Subject to change.)

Course Materials

- Required: *The Book of R* by Tilman Davies.ISBN-13: 978-1-59327-651-5. Link to publisher website: https://nostarch.com/bookofr (Between Aug. 15 and Oct. 15 use code ACDCPSC292 to receive 30% off purchase through the NoStarch Press website.)
- Recommended: *R Graphics Cookbook* by Winston Chang. First Edition, O'Reilly Media. ISBN 9781491978603
- Course fees: none.

Course Learning Outcomes:

At the completion of this course, students should be able to:

1. Understand the basic structure and function of the *R* programming language.
2. Understand and follow best practices in scientific computing.
3. Independently create and perform basic data analysis and visualization in a way that communicates ideas clearly.

Program Learning Outcomes:

This course provides students with training in the following program learning outcomes (identified by degree):

- (Biological Sciences) Students will apply quantitative reasoning and analysis to biological science problems.
- (Computer Science) Graduates will have mastered the foundational principles of computing and problem solving.
- (Computer Science) Graduates will be able to present technical information in both oral and written formats.

Contract Grading Scheme

This course will operate on a contract grading scheme. This means simply that you choose your target grade at the beginning of the semester and we (the student and instructor) agree upon the terms of the final letter grade that you target. This is a labor-based and mastery-based grading system, meaning that:

1. your labor and participation in course materials determines the grade you receive; and
2. the completion of work will directly indicate your level of mastery with the material.

A sample contract has been provided for help constructing your course contract which will be due at the end of the first week of class. You will have three opportunities to revisit your contract during the semester.

How Student Work is Assessed (Labor-based System)

All work is scored on a three-tiered scale:

- completed and satisfactory (score of 1),
- completed and unsatisfactory (score of 0), or
- not completed (score of 0).

If an item does not reach a satisfactory level, you will have the opportunity to revise it after receiving instructor feedback and/or peers to move it up to the completed and satisfactory level.

Types of Work (Mastery-based System)

There are three types of work, completion of each indicates level of mastery of the material. In this class, these will be:

- **Assignments**: completion indicates *basic competence* of the learning objective(s) being assessed. (This will be C-level work.)
- **Skill Checks**: completion indicates *advanced competence* of the learning objective(s) being assessed. Typically, this will involve more synthesis of concepts and independence than assignments to complete. (This is B-level work.) There will be 6 Skill Checks during the semester.
- **Projects**: completion indicates *mastery* of the learning objectives(s) being assessed. Projects will involve not only synthesis of a broad range of concepts, but also creativity, independence, and originality of work. (This is A-level work.) There will be 3 projects during the semester.

As such, completing these assignments will indicate your level of mastery in the material covered in the course.

Final Course Grade	**Projects completed (A-level)**	**Skill Checks completed (B-level)**	**Assignments completed (C-level)**
A	3	6	100 %
B	1	6	100 %
C	0	2	100 %
D or F	0	< 2	< 90 %

About deadlines

There will be deadlines for completion of work typically one week after the material needed to complete the item's learning objective is covered in class and the item is assigned. After this deadline, items will be scored as not complete (0). Items can also be submitted within 48 hours of the deadline to be considered late. Since it is often not possible to operate perfectly during the semester, we can build the following leeway into our basic contract:

Final Course Grade	**Number of late assignments**
A	3 B- or C-level items, 1 A-level items
B	5
C	7
D or F	>7

These late items can be applied to any of the levels specified in the table (if none are listed, they can be applied to any level).

Attendance and Participation

Learning depends on engagement, and engagement depends on both the relationship between students and instructors and the general learning environment. Engagement is a relationship, and like any other relationship, depends on two people: the instructor and the student. I will do my part to come to class prepared with interesting material and a science-based lecture style that includes active learning techniques. I expect you to come to class prepared by completing any assignments and willing to participate in your own learning. Furthermore, I expect you to cultivate a positive and welcoming learning environment for you and your fellow students.

In order to do this, class attendance *and participation* is mandatory throughout the semester.

How participation will be assessed: I will mark days in which you don't participate. This could be due to: absence, excessive lateness (more than 10 minutes), not working on class exercises, not engaging with group work, not engaging in lecture materials, being excessively distracted or distracting (including being off-task on the computer or phone), not viewing Panopto videos in a timely manner, etc. Since no one is perfect, we can build the following into the basic contract:

Final Course Grade	Number of days not participating in class
A	4
B	7
C	9
D or F	>9

Pluses and Minuses on Course Grades

Pluses and minuses on course grades are at the instructor's discretion. These can be further built into the student's individual contract, but these terms are finalized at the end of Unit 3.

Other Course Policies

COVID: Wearing a mask in class is key to stopping the spread of SARS-CoV-2 and preventing illness. Please wear a mask in class and in office hours, regardless of vaccination status. If you do not have a CLEAR status email, you will be asked to leave class. Any student required to quarantine or isolate due to exposure to or infection with SARS-CoV-2 will be able to attend classes remotely when possible. I am happy to work with you regarding making up class work.

The Life-Happens Clause: I understand that life happens, and you may not want to discuss with me exactly what is going on to catch a break. You are allowed to invoke this clause on any item (except those during the final exam period), no excuse required. Simply do so by email or slack within 3 business days of when item was scored (so within 3 days of an assignment due date or 3 days after a missed class). Special COVID amendment: you may invoke the clause as many times

as needed. If it becomes habitual, consider contacting me so we can work out a better timetable for submitting assignments.

Final Project Policy: You must participate in and pass the final project in order to pass the course. *There will be no exceptions to this policy.* If you are aiming for C-level work, you must attend the final exam period where projects are presented (even if you don't otherwise contribute).

Electronic Devices (phones, computers, etc): Please refrain from inappropriate usage of electronic devices during class. I reserve the right to ask you to discontinue the use of any electronic device which becomes a significant distraction to your classmates or me. Switch cell phones to silent/vibrate. You may make audio recordings of the lectures for personal use, but do not share them with others or post them publicly without my written permission.

Group Work: I encourage group work on all assignments and during class, except those explicitly stated to be *individual evaluations*. You are free to assume that an assignment is meant to be worked on together unless otherwise directed. If you work in groups on an assignment, simply list the members of your group on the top of the assignment.

Attendance/Absence: I expect you to attend every lecture. There are no make-up work except under extraordinary circumstances for which documentation exists or otherwise noted. I appreciate you making it to class on time, defined as within 5 minutes of the class start time.

Communications: I prefer Slack over email, please send a DM to me rather than an email. I reply to emails and slacks within regular working hours (9 am to 5 pm, M-F). I will try my best to respond within one working day. Please check the syllabus before asking a question about the course. Detailed questions are best asked during office hours, you will get a better and more thorough answer. If your question takes > 3 mins to respond to, I will ask you to come to office hours. Please treat email as formal communication; if you are unsure of how to properly format an email to your professor, please ask me. Slack is far more informal, memes and animated gifs are encouraged.

Chapman University Policies

Academic Integrity Policy: Chapman University is a community of scholars that emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work and academic dishonest of any kind will be subject to sanction by the instructor/administrator and referral to the university Academic Integrity Committee, which may impose additional sanctions including expulsion. Please review the full description of Chapman University's policy on Academic Integrity.

Students with Disabilities Policy: In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Office of Disability Services. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your

professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services at (714) 516-4520 if you have questions regarding this procedure, or for information and to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for an accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.

Equity and Diversity Statement: Chapman University is committed to ensuring equality and valuing diversity. Students and professors are reminded to show respect at all times as outlined in Chapman's Harassment and Discrimination Policy. Any violations of this policy should be discussed with the professor, the Dean of Students and/or otherwise reported in accordance with this policy.

Student Support at Chapman University

Over the course of the semester, you may experience a range of challenges that interfere with your learning, such as problems with friend, family, and or significant other relationships; substance use; concerns about personal adequacy; feeling overwhelmed; or feeling sad or anxious without knowing why. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. You can learn more about the resources available through Chapman University's Student Psychological Counseling Services here: https://www.chapman.edu/students/health-and-safety/psychological-counseling/.

Fostering a community of care that supports the success of students is essential to the values of Chapman University. Occasionally, you may come across a student whose personal behavior concerns or worries you, either for the student's well-being or yours. In these instances, you are encouraged to contact the Chapman University Student Concern Intervention Team who can respond to these concerns and offer assistance: https://www.chapman.edu/students/health-and-safety/student-concern/index.aspx. While it is preferred that you include your contact information so this team can follow up with you, you can submit a report anonymously. 24-hour emergency help is also available through Public Safety at (714) 997-6763.

Additionally, you can come talk to me at any time, for any reason. My door is open!