UCR GradSuccess
GradQuant

2020 Summer Statistics and Programming Bootcamp

July 6th – August 28th in Zoom
Section I: *Tuesday 9 – 10:50am*
Section II: *Wednesday 9 – 10:50am*
Section III: *Thursday 9 – 10:50am*
Section IV: *Thursday 2 – 3:50pm*
Office hours (in Zoom): *Thursday, 11am – 1pm*

Team

Rebecca Kurtz-Garcia
Statistics and Programming Bootcamp Instructor
PhD student in Applied Statistics
E-mail: rebecca.kurtz@email.ucr.edu
Appointments: Office hours on Thursdays, 11am to 1pm. If you are not available during this time, please send me an email to discuss your question.

Dr. Yelda Serin
GradQuant Coordinator
E-mail: yelda.serin@ucr.edu | https://gradquant.ucr.edu/
**Yelda serves in an administrative role in the bootcamp.*

Purpose

This bootcamp provides a review or *refresher* of various topics in descriptive and inferential statistics, as well as applications within your fields. You will also receive a brief introduction to Excel and the R programming language. This series of workshops will cover the prerequisite material needed to take graduate-level courses on statistical methods and to perform analyses on various kinds of research data.

Key Learning Objectives

The goals of this bootcamp are to provide a solid understanding of the principles underlying statistical inference and null hypothesis significance testing, so that you: 1) are able to articulate which statistical tests to use for various types of data, and 2) become comfortable applying these tests and interpreting output in various software environments (i.e., Excel, R, Python).

At the end of the term, you will be able to:

1. Recognize various types of data.
2. Summarize data effectively using plots and descriptive statistics.
3. Choose the correct statistical analyses for a variety of experimental situations.
4. Use Excel and R software to carry out statistical analyses.
5. Interpret correctly the results of statistical analyses produced by software and that appear in scientific literature.

Prerequisites

None. If the topics within this syllabus look completely foreign to you, do not be scared off! You have the perfect background knowledge for this bootcamp. If you have previously learned some of this material, but have not used it in a while, you should take this bootcamp to refresh your knowledge of the topics. If any of the content intimidates you or brings back bad memories (hopefully not), you can rest assured that Rebecca is an approachable, responsive instructor. Feel free to ask questions in office hours, or over email if you prefer, regarding any topic that you are uncertain about.

Structure

The bootcamp will consist of one workshop a week for each section. This bootcamp is not for credit and has no exams; however, there will be weekly homework. Only you will know how well you did; so, you can test yourself by participating in the workshops as much as possible. Workshops will focus on major conceptual topics in statistics and modeling that are widely applied across a range of scientific fields. Each week there will be office hours available, in addition to the workshops. During office hours, you can work with the instructor to solve problems or to clarify examples with which you might have struggled. You are encouraged to work on the workshop exercises individually or in small groups of two or three.

Homework

There will be weekly assignments (10 points each). Each weekly assignment will be complementary to what we learn in the lecture that week. All assignments must be completed and uploaded to the instructor using iLearn on the due date. Late assignments will not be accepted without prior permission of the instructor.

Turnaround/Feedback

During the week (Monday through Friday) I will check emails multiple times. If you have a concern and send me an email message, you can expect a response within two days. Please be sure to include your name and section in the email. If you are emailing about programming problems, sending the code and error message is also helpful.

Computing

You will need access to a computer with Excel, R and R studio. The links to download each are listed below.

- **Excel** (free for UCR students) http://cnc.ucr.edu/scs/office365.html
- **R** (free - required) https://cran.r-project.org/
- **RStudio** (free - required) https://www.rstudio.com/products/rstudio/download/
    - Install RStudio Desktop (the free version) after installing R

Textbook

OpenIntro Statistics, 4rd edition by Diez, Barr, and Çetinkaya-Rundel. This is an open source textbook, available as a free PDF: https://www.openintro.org/stat/textbook.php?stat_book=os.

We recommend reading the sections of the textbooks, as listed on the next page, before the associated workshop to maximize your learning of the material. By participating in the discussion/examples and doing the recommended practice exercises after the workshops, you will further reinforce your understanding.

Attendance

GradEdge/JumpStart (GE/JS) students: Attendance is mandatory for GE/JS students. If you miss a bootcamp session without getting a prior excused absence request approved, your stipend will be reduced. To request an excused absence, email Rebecca as early as you can **(but at least 48 hours prior)** and CC Yelda (yelda.serin@ucr.edu) and GE/JS Coordinator, Marziyeh Kameli (gradedge@ucr.edu). In this email, you must include:

- Your name and SID#,
- Day/session from which you wish to be excused, and
- Details about why you need to be excused.

We will respond to your email to confirm whether you are excused.

If you miss a bootcamp session due to an emergency, let us know as soon as it is safely possible after you deal with the emergency situation. Even if you miss a bootcamp session for any reason (excused absence or an emergency), you are still expected to submit the homework assignment for that session. We recommend that you come to the next Office Hours to ask any questions you may have about the material you missed.

Current UCR graduate students: Attendance is not mandatory for you, but you are still expected to attend all session in order to get the best out of the bootcamp and let us know if you will be missing a workshop.

Workshop Schedule

Week	Topics
Week 1 *July 7-9th*	**Types of data; descriptive statistics** *Suggested Reading: §2.1-2.2*
Week 2 *July 14-16th*	**Probability** *Suggested Reading: §3.1, 3.2, 3.4, 3.5*
Week 3 *July 21-23rd*	**Probability Distributions** *Suggested Reading: §4.1, 4.3*
Week 4 *July 28-30th*	**Central Limit Theorem; Confidence Intervals** *Suggested Reading: §5.1–5.3*
Week 5 *August 4-6th*	**Introduction to Inference** *Suggested Reading: §5.3, 6.1, 7.1-7.3*
Week 6 *August 11-13th*	**Analysis of Variance (ANOVA)** *Suggested Reading: §6.3*
Week 7 *August 18-20th*	**Linear Regression and Correlation** *Suggested Reading: §8.1-8.4*
Week 8 *August 25-27th*	**Specialized Topics** *Suggested Reading: Handout*

Each week will also feature a tutorial using software. This tutorial will either be on features of the software itself, or on how to implement and calculate statistics and tests learned during the workshop.