

Syllabus

CLRE 253 – BIOSTATISTICS I, 2 UNITS

Winter 2019

Course instructor

Florin Vaida, PhD, fvaida@ucsd.edu; Office hours: by request

Course Teaching Assistant

Sandahl Nelson, s8nelson@ucsd.edu

Course Description

This course offers a rigorous, intensive introduction to Biostatistics. The first part of the course introduces the fundamentals of statistical inference: summarizing and visualizing data, probability, normal and binomial distribution, sampling, central limit theorem, confidence intervals, hypothesis testing. The second part of the course gives you the skills to understand and conduct the most commonly used analyses for continuous (scale) and binary response variables in the case of one-, two-, and three or more groups. The statistical methods will include independent samples and paired samples t-tests, tests based on ranks, Pearson's chi-square and Fisher's exact tests for binary variables, paired tests for continuous and binary variables, one-way ANOVA, and correlation. Basic issues of study design will be discussed (clinical trials versus observational studies; sample size calculation; limitations of direct group comparisons in non-randomized studies). Data analyses will be conducted in SPSS using datasets based on real-world biomedical studies and applications. This course is a pre-requisite for taking advanced statistical courses.

Course Organization

Two 50-minute sessions per week. Case studies will be introduced and discussed for each key statistical method. We will also conduct interactive data analysis sessions using SPSS. Students will work in small groups and individually.

Course Goals

Provide the knowledge, tools, and practical experience for understanding the basis of statistical inference, and for performing most commonly used basic statistical analyses for cross-sectional observational studies and randomized clinical trials.

Course Objectives

1. Develop a solid understanding of basic statistical concepts, and of the common statistical methods appropriate for biomedical data.
2. Develop the ability to read critically and understand the aspects of study design and statistical analysis from studies reported in the scientific biomedical literature.
3. Develop facility with examining and analyzing biomedical datasets using the appropriate statistical methods, in SPSS.

Prerequisites and Preparation

Install SPSS Statistics on your laptop prior to first class, using the "SPSS Download" instructions on the TritonEd page. The SPSS license is provided by UCSD for the duration of the course. Bring your laptop at all lectures and perform the analyses in "real time", with the instructor.

Course Materials/Resources – Required and Recommended

- Textbooks: Dawson and Trapp: Basic and Clinical Biostatistics, 4th edition. Lange Medical Books, 2004. Web: <http://www.clinicalbiostatistics.com>. Provided and required.
- Other Materials: Detailed course notes are provided
- Computer software: IBM SPSS Statistics. See the SPSS link on TritonEd for authorization code. SPSS will be used in class, for homework, and for the final exam.
- Online resources: TritonEd, at <https://triton.ed.ucsd.edu/webapps/login>
- Additional resources: A Field, “Discovering Statistics Using IBM SPSS Statistics”, 5th Ed., 2017. 816 pages. The methods and SPSS analyses are discussed in detail, with a jocular tone, yet scientifically rigorous. Recommended.

Course Schedule

Lecture	Date	Topic	Reading	Assignment
L1	Jan 10	Study design; data summaries & visualization	DT Ch2,3	
L2	Jan 17	Probability; normal distribution	DT Ch4	Hw1 due
L3	Jan 24	Central limit theorem, confidence intervals	DT Ch4,5	Hw2 due
L4	Jan 31	Hypothesis testing, single group	DT Ch5	Hw3 due
L5	Feb 7	Inference for means of two groups	DT Ch5,6	Hw4 due
L6	Feb 14	Inference for proportions	DT Ch4,5	Hw5 due
L7	Feb 21	Comparing proportions, two groups	DT Ch5,6	Hw6 due
L8	Feb 28	Comparing 3 or more groups: ANOVA	DT Ch7	Hw7 due
L9	Mar 7	Comparing 3 proportions; Correlation	DT Ch6, 8	Hw8 due
L10	Mar 14	Review		Hw9 due
Final	Mar 21	Final Exam	DT Ch1-8	

Course Components

- Weekly assignments, to be submitted through Blackboard.
- Homework is due at 11:59pm, on the following week. Late homework is not acceptable.
- The only acceptable format is .pdf. Do not submit raw SPSS output.
- One homework submission for a **group of two students**. Students are responsible of finding their own group partner (e.g., ask the colleague to your right). Homework 1 & 2 only may be submitted individually. For homework 3 or later, groups may only be changed with the instructor’s approval.

Final Exam

- In-class, open-book, written 1h:50min exam, last week of the course. The exam will involve data analysis in SPSS, and/or hand calculations.
- A make-up exam date will be set up for students with extenuating circumstances. These should make arrangements with the instructor at least one month in advance.
- *The best tool for preparing the final exam is practice on the prior final exams, posted on TritonEd.*

Grading Policy

- The course grade will have two components: Homework (35%) and Final exam (65%).
- **All students receive a final grade bonus of 0-2 percentage points, based on completed evaluation by the class as a whole (0% = 0 points, 100% = 2 points, with linear interpolation in-between).**

Grade Thresholds:

Grade	Total Score		Grade	Total Score
A+	98-100		C+	75-77.9
A	94-97.9		C	73-76.9
A-	90-93.9		C-	70-72.9
B+	87-89.9		D	60-69.9
B	83-86.9		F	0-59.9
B-	78-82.9			

- Plagiarism will be dealt with according to the UCSD Policy of Integrity of Scholarship
- See your grades on TritonLink <https://TritonLink.ucsd.edu> (if you are matriculated- in MAS Program), on MyExtension <https://myextension.ucsd.edu/> (if you are non-matriculated/CREST, concurrent enrollment)

Course Policy and Expectations (classroom rules of conduct)

- Time Commitment: Expect to spend 4-6 hours a week outside of class.
- Attendance Policy: The general CREST attendance policy applies, no more than 3 missed sessions are allowed. You have to be present in both halves of the class.
 - Academic Integrity (Plagiarism): <http://academicintegrity.ucsd.edu/>
 - Late homework is not acceptable.

Communication with lecturers

The best way to reach us is via email. We will respond within 24 hours under usual circumstances.

Student Evaluation of Course and Faculty

Course and faculty evaluations provide important feedback to instructors to improve course content and teaching methodology. The evaluations are also an important factor in faculty advancement. A link to one-time course evaluations using Survey Monkey is available on the TritonEd course page. All students will receive a final grade bonus of 0-2 percentage points, based on evaluation completion by the class as a whole (0% = 0 points, 100% = 2 points, with linear interpolation in-between).

Technical Requirements

The student needs to bring their laptop with a valid SPSS license to every class and conduct analyses at the same time with the instructor.

Accommodations: If you have a disability that may impact your academic performance, you may request accommodations by submitting documentation to: <https://students.ucsd.edu/well-being/disability-services/>