

## CLRE-265: Advanced Regression Methods

CREST/MAS Program, UCSD

Spring 2015

Course Instructors: Florin Vaida, PhD  
Anya Umlauf, MS

[fvaida@ucsd.edu](mailto:fvaida@ucsd.edu)  
[aumlau@ucsd.edu](mailto:aumlau@ucsd.edu)

Prerequisites: CREST/MAS Biostatistics I/II or equivalent, and working knowledge of SPSS

Textbook: Lecture notes.

Additional instructional materials will be made available during the course, and on the Blackboard site.

Course Software: SPSS version 22

In addition, for some advanced topics we may use the R open source software, available at <http://www.r-project.org/>

Students are required to have both programs installed on their laptops.

Course Objectives:

1. To introduce and familiarize the students with advanced statistical methods
2. To build working knowledge with data analysis using these statistical methods in SPSS (and R, when relevant)
3. To equip the students with knowledge, experience and resources for analyzing data requiring these advanced statistical methods

Teaching Format:

Ten weeks, two 50-minute sessions each. Case studies will be discussed and analyzed for each key statistical method. The sessions will involve hands-on, interactive data analysis sessions using SPSS. Students will work individually and in small groups. Presentations of student projects will take place on the last week of class, in lieu of a final exam. Progress updates will be presented throughout the quarter.

Course Grade:

The course grade will have three components:

1. **40%** Homework (including final project updates)
2. **10%** *Attendance + submission of lecture and course evaluations on-line*
3. **50%** Final project

Groups:

1. The students may work in *groups of two or three (no more than 3)* for homework and the final project.
2. All students in the group will receive the *same grade for each assignment*.
3. The final course grade may differ within a group, however, e.g. due to incomplete lecture evaluations or absences during project presentations.
4. Students are responsible for forming their own groups. Students who did not find a group should inform the instructor(s) asap.
5. Homework 1 and/or 2 may be submitted individually.
6. All groups *must be set by homework 3* and cannot be changed afterwards.
7. Any issues regarding *lack of equal participation* of all members of the group should be brought to the attention of the instructor asap.

Homework: Will be posted on Ted. Solutions are due at class time, to be submitted only via Ted. *One homework submission per group*.

Final Exam: *There will be no final exam.*

Final Project:

1. The students will work in groups of 2 on a final project.
2. This will involve the analysis of a study requiring methods introduced in the class, preferably from the students' own research.
3. The final product will be in the form of a **paper, and of a 5-15 minutes presentation**, to take place on the last day of class.
4. The level of the presentation will be similar to that of a scientific meeting, with a larger emphasis on the statistical analysis.
5. The paper will have a similar structure to a scientific publication (abstract, introduction, methods, statistical analysis, results, discussion, references, tables and figures).
6. *All students must be present for the final presentation, and to participate in the presentation. Students absent from the final presentation will only receive 50% of credit for the final project.*
7. Timeline:
  - Week 4 (Homework 3): a 1-2 page project proposal is due
  - Week 8 (Homework 7): preliminary analysis results is due
  - Week 10: final project and presentation is due

Attendance Policy: General CREST attendance policy, no more than 3 missed sessions are allowed. You have to be present in both halves of the class.

Time Commitment: Expect to spend 4-6 hours a week outside of class.

### Timeline:

	<b>Date</b>	<b>Topic*</b>	<b>Assignment</b>
Wk1	Mar 30	Linear mixed effects for longitudinal data	
Wk2	Apr 6	GEE models for longitudinal data	Hw 1 due
Wk3	Apr 13	Logistic regression: (i) overdispersion, (ii) longitudinal data	Hw 2 due
Wk4	Apr 20	Logistic regression: ROC curves	Hw 3 due (project proposal)
Wk5	Apr 27	Categorical data analysis: contingency tables and loglinear models	Hw 4 due
Wk6	May 4	Categorical data analysis: proportional odds model for ordinal response	Hw 5 due
Wk7	May 11	Categorical data analysis: multinomial regression for nominal response	Hw 6 due
Wk8	May 18	<i>Student presentations: Preliminary analysis</i>	<i>Hw 7 (prelim. analysis)</i>
	May 25	Memorial Day – NO CLASS	
Wk9	June 1	Other topics: Meta-analysis	Hw 8
Wk10	June 8	<i>Student Project Presentation</i>	<i>Final project due</i>

\* Subject to change

### Additional Resources:

1. Marija J. Norusis: SPSS Statistics 19 Advanced Statistical Procedures Companion, Addison Wesley, 2011.
2. BS Everitt: Statistics for Psychologists – An Intermediate Course, Lawrence Erlbaum Associates, Mahwah, New Jersey, 2001.
3. S Landau and BS Everitt: A Handbook of Statistical Analyses using SPSS, Chapman & Hall/CRC, 2004. (For SPSS background and basic statistical methods)
4. Vittinghoff E, Glidden D, Shiboski S, McCulloch C: Regression Methods in Biostatistics, 2<sup>nd</sup> Ed. Springer, 2012.