

STA 4210 Regression Analysis Fall 2019

Section 9631, Class No. 21249, MWF 3rd period, 9:35am–10:25am, FLO 100

Instructor Deborah Burr, 116C Griffin-Floyd Hall (FLO); Office Hours: MWF 11:35am–12:25pm, or by appointment; Email: burr@stat.ufl.edu (put “4210” in the subject line); Phone: 273-2973 (do not leave a message).

Teaching Assistant Karina Gelis-Cadena, FLO 103C; Office Hours: MW 4:00pm–4:50pm; Email kgeliscadena@ufl.edu

Required Materials

Textbook Kutner, Nachtsheim, Neter, and Li, *Applied Linear Statistical Models*, 5th ed., Volume I (Chapters 1–14, Appendix A)

Scientific calculator You need one which will compute the mean and standard deviation automatically. You will use it for tests. A graphing calculator is allowed.

Statistical Software We will use the free statistical computing language R; download it in the first week of the semester from <http://www.r-project.org>. Also download Rstudio from <http://www.rstudio.com> (Desktop free license).

Prerequisite STA 3024, or STA 3032, or STA 4321 and STA 2023, or MAS 3114 and STA 2023, or MAS 4105 and STA 2023

Course Description The course is primarily on the linear regression model, for which the main techniques are rooted in the method of least squares. Procedures are motivated by applications. Mathematical results are stated and explained, and occasionally derived. A course in mathematical statistics is helpful but not strictly required. The focus is on carrying out and explaining the methods. After some review of basic statistics, the course proceeds systematically through the simple regression model, the multiple regression model, the matrix formulations of both these models, and a number of related tools such as model diagnostic measures, collinearity statistics, and variable selection procedures. Computations will be carried out in the R statistical programming language.

Main Course Objectives

1. With two quantitative variables, be able to carry out correlation and simple regression analyses, and to correctly interpret such analyses.
2. Be able to carry out and interpret inference procedures for simple linear regression.

3. Know the simple and multiple linear regression models, and be able to state and explain the standard methods of estimation for these models.
4. Know the multiple linear regression model in its matrix form, including all the common variations on this model (eg. continuous predictors, categorical predictors, square and interaction terms).
5. Know what is the general F test; given a particular multiple regression scenario, be able to apply the general F test.
6. Be able to carry out and interpret inference procedures for the various types of multiple regression model, including the quadratic regression model.
7. Know what are the purposes of diagnostic methods in simple and multiple regression; be able to carry out several common diagnostic procedures and interpret them.
8. Know what multicollinearity is, why it is an issue in multiple regression, and how to analyze and deal with its presence.
9. Know several measures of model performance (R^2 , adjusted R^2 , and Akaike's Information Criterion), how to compute and interpret them for a multiple regression model.

Grading Your final course grade will depend on your course score based on the following four components with their respective weights:

Homework/Quizzes:		25%
Exam 1:	Wednesday September 25 (8:20–10:10pm, location TBA)	25%
Exam 2:	Wednesday October 30 (8:20–10:10pm, location TBA)	25%
Exam 3:	Monday December 9 (3pm–5pm, FLO 100)	25%

The assignment of letter grades will be determined as follows (cutoffs will be no stricter than indicated, and may be relaxed): A 93–100; A⁻ 90–92; B⁺ 87–89; B 80–86; B⁻ 77–79; C⁺ 74–76; C 67–73; D 50–66; E < 50

The calculation of your final average will be done outside of Canvas; the formula used by Canvas will not necessarily produce the final average according to the course grading scheme. Information on current UF policy for assigning grade points may be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Homework/Quizzes There will be about eight homeworks to be submitted on Canvas. Some but not all of the problems on each homework will be graded. A crucial part of homework assignments is to show your work and explain your reasoning. It is not sufficient to simply give a numerical or one-word answer. Some homeworks will require you to use R and to produce a written report of a data analysis. You need to earn a total of 220 points for a perfect homework score; there will be at least 250 points possible. (If you earn a total score over 220, this will not count extra.) There will be some announced in-class quizzes based on the

homeworks; quiz scores will be added to your homework score. Quizzes will be closed book and closed notes.

Exams There will be three exams. On each exam, there will be some short-answer questions, both multiple-choice and fill-in-the-blank types. Other questions will require a written response; for these questions, it is not sufficient to simply give a numerical or one-word answer. There will be short calculations required; you need a calculator for the exams. On each exam, there will be at least one question which describes a regression scenario, gives R output from the analysis, and asks you to interpret the output. The exams are closed-book, closed-notes. You may bring one 8.5×11 sheet of notes to each exam. Bring a picture ID, your calculator, pencils and erasers.

Course Policies

Homework You are allowed to get help with homework problems, but your final write-up must be your own. Homework must be submitted on Canvas by the posted due date and time. Late homework will not be accepted.

Exams Makeup exams must be approved before the time of the exam and will generally be given only in case of medical or family emergencies, which must be appropriately documented. More detailed policy for granting a makeup exam may be found in the undergraduate catalog under Attendance Policies

(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).

For cases of illness, a doctor's signed note will be required.

Email Use email only for administrative matters. Email me at burr@stat.ufl.edu, and put the course number in the subject line. See me or a TA in person for content questions. The ideal time to ask questions is right after class.

Honor Code All work on quizzes and exams must be entirely your own. Refer to the UF Honor Code at <http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>.

Disabilities Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.