

Statistics 5302
Intermediate Data Analysis II

Time and location – MWF 1:55-2:45 or MWF 3:00pm-3:55pm in CH 312

Course description: This is an applied data analysis course focusing on simple and multiple linear regression models, the two-way ANOVA model, logistic regression, and a bit of experimental design. See the tentative course schedule listed below for more detail.

Prerequisite: Stat 5299, 5301, or 529, or permission of instructor. Not open to students with credit for 530.

Instructor: Scott Linder (linder.5)

Office hours: M 4–5:30, W 5:15–6:15, F 5:15–6:15 in CH 205C.

Text: The Statistical Sleuth, 3rd edition, by Ramsey and Schafer.

Course web page: Check the course Carmen page frequently for class news and announcements, handouts, assignments, practice tests, etc. You are responsible for checking in regularly enough to notice posted assignments, which will be announced in class also.

Software: We use the **R** Statistical Software environment for this course. The software may be downloaded freely from <http://www.r-project.org/>, and you should do so during the first week of class. You will be provided with class supporting documentation to help out, but you should expect technical difficulties early, as the package has a rather steep learning curve. You will use **R** to analyze data in homework assignments.

Course grades: Your course average will be determined using the following weights.

Exam 1	25%
Exam 2	25%
Final Exam	30%
Homework	20%

Exams: We will have two regular in-class exams, scheduled for February 18 and April 5. We also have a final exam, which covers all course material. For each regular in-class exam you may use one page of notes (both sides, 8.5 x 11 inch) with whatever facts, formulas or explanations you find helpful. For the final exam you may use three such sheets of paper. Calculators may be used, but any calculator you use for an exam must be “stand-alone” (not an application or part of a cell-phone, PDA or any other communication device).

Makeup Exam Policy: Occasionally emergencies occur. If you need to miss an exam, contact Dr. Linder immediately for a possible makeup date. Documentation requiring a makeup exam **will** be required. Makeup exams will differ from the regular exam, and must be taken within a 72 hours of the missed scheduled exam time. If you cannot make up a missed exam in this time constraint, and if you have no documentation to support the missed exam, you will receive 0 for the missed exam. If you have a documented excuse for missing the exam but cannot make it up within 7 days, your other exam score and the final exam score will be reweighted (to 35% and 45%, respectively) in computing your course average.

Homework: Will be posted to the course Carmen page and collected in class on appointed due dates. **Late homework will not be accepted** because solutions to homework assignments will be posted to the Carmen page immediately. If you cannot show up to class in order to turn in a homework assignment, you **must** submit it **before** the due date. All homework submitted must be stapled, or it will not be accepted (with 100 students loose papers cannot be handled). **I will not accept homework by email, without permission granted before you send it.**

Grading: You must provide support for all homework and exam solutions. That is, show work or receive no credit. All answers must be interpreted in context of the problem. On assignments, any problem requiring use of R requires that you attach edited which includes the R commands you used along with organized and nice-to-read output and computer graphics. This output needs to be free of long lists of output and commands that didn't work. Do not append this output to the back of the assignment – integrate it into your work as it's referenced.

Policy for class attendance: There are two sections of this class running concurrently. Although I will try to keep the courses together as we progress, there are two important reasons that you must attend the class meeting for the class session in which you are formally enrolled: (1) the classes are overenrolled; and (2) at various times the classes will be out of synch. Only if you absolutely must, you may occasionally choose to attend the other section for lecture... but you must never attend the other section for an exam. And, on any date an assignment is due, you must attend the meeting time corresponding to your section of enrollment.

E-mail correspondence: In order to protect your privacy, all course email correspondence must be done through a valid OSU name.nn account. **Do not send email to me using a different email account.**

Disclaimer: I will attempt to adhere to the information in this syllabus to the best of my ability. However, I reserve the right to change assignment dates, exam dates, and to edit the order or even inclusion of course topics covered. I also reserve the right to include some topics that may not be listed in the schedule. Announcements made to the Carmen page or in class will supersede any information modified in this syllabus. Your failure to be in class when an announcement is made will not be accepted as an excuse.

Academic misconduct: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Disabilities statement: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Tentative Course Schedule

Date	Topic	Reading Sections
M 1/7	Introduction; Simple linear regression model	7.1–7.3
W 1/9	Least squares estimation; Inference about slope and intercept	7.3–7.4
F 1/11	Estimate of the mean of Y at x ; Prediction of future Y at x	7.4
M 1/14	Residual diagnostics	8.1–8.3
W 1/16	Transformation; Assessment of model fit via lack-of-fit tests	8.4–8.5
F 1/18	R -squared, Simple linear regression vs. one-way ANOVA	8.6
M 1/21	No Class – MLK Day	
W 1/23	Data analysis – Case study (Review)	
F 1/25	Multiple linear regression model	9.1–9.2
M 1/28	Ladder of power transformation; Interpretation of coefficients	9.2–9.3
W 1/30	Creating explanatory variables	9.4–9.7
F 2/1	Inference about regression coefficients	10.1–10.2
M 2/4	Linear combination of coefficients; Predictions	10.2, 10.4
W 2/6	Testing a group of coefficients (F-test)	10.3
F 2/8	Data analysis – Case study (Review)	
M 2/11	Residual plots	11.1–11.2
W 2/13	Case-influence statistics	11.3–11.4
F 2/15	The added variable plot	11.5
M 2/18	Exam 1	
W 2/20	Weighted least squares	11.6–11.7
F 2/22	Sequential methods for variable selection	12.1–12.3
M 2/25	Model selection criteria	12.4
W 2/27	Bayesian methods	12.5
F 3/1	Bayesian model selection	12.5
M 3/4	Model averaging	12.5
W 3/6	Data analysis – Case study (Review)	
F 3/8	Two-way ANOVA model; Additive/non-additive model	13.1–13.2
M 3/11–F 3/15	No class – Spring break	
M 3/18	ANOVA table; Degrees of freedom	13.3
W 3/20	Testing for a factor's effect; Sequential sum of squares	13.3
F 3/22	Multiple comparisons	13.5.5
M 3/25	Test for interaction and interaction plots for two-way ANOVA	13.3.5
W 3/27	Data analysis – Case study (Review)	
F 3/29	Mixed effects model; Tests for block effects	13.3–13.6
M 4/1	ANOVA with several factors	14.1–14.2
W 4/3	Two-way ANOVA with a single replicate	14.3, 14.5
F 4/5	Exam 2	
M 4/8	Three-way ANOVA with a single replicate	14.4, 14.6
W 4/10	Binary response variables and the logistic regression model	20.1–20.2
F 4/12	Logistic regression – estimation and inference	20.3–20.4
M 4/15	Data analysis – Case study (Review)	
W 4/17	Designing an experiment	23.1–23.4
F 4/19	Designing an experiment	23.6, 23.8
M 4/22	Course summary and review	