Instructor Information:
Andrew (Andy) Wiesner, PhD
Department of Statistics
308 Thomas Building
ALL emails to me must be sent using ANGEL under Communicate tab.

Office Hours: Monday 10:00 – 11:00 AM

If you visit office hours to discuss course concepts (e.g. homework, lecture concept) you MUST have your lecture notes with you. Otherwise your questions will not be answered.

Prerequisite**: 6 credits in statistics; matrix algebra.

** In past semesters too many students have come to Stat 501 without having satisfied the statistics prerequisite of Stat 500. The result was a slow down in content coverage in order to get those students prepared. That is no longer the case. We will be moving forward as if EVERYONE has met this requirement. (My concerns with the matrix algebra are not nearly as great as those for statistics). This will allow us to get to such topics as logistic regression and ANCOVA; two topics that many of you will find useful in your own research and/or in preparation for future statistics courses, for example Stat 502-ANOVA. If you have NOT met the statistical prerequisite and are concerned about your ability to handle Stat 501, then you are strongly encouraged to drop this course and register for Stat 500. I will not entertain questions on whether or not you are prepared by answering your inquiries about the relevancy of other statistics courses (non Stat 500) that you have taken, what specific topics of from 500 are of importance, or provide any "quiz" to test your preparation.

Description: This course offers an introduction into regression analysis. A researcher is often interested in using sample data to investigate relationships, with an ultimate goal of creating a mathematical model that best fits the data involves regression analysis. Topics will include: simple and multiple linear regression, inference, diagnostics, building a regression model, and correlation. We will use the statistical software Minitab to conduct our analyses. Minitab is loaded on the campus computers. If you plan on working away from campus you may want to consider purchasing a copy at the PSU Computer Store or downloading a free 30-day trial at www.minitab.com or also using PSU remote apps (https://webapps.psu.edu/)

Text: Applied Linear Statistical Models (5th edition), Kutner, Nachtsheim, Neter and Li

OR

Applied Linear Regression Models (4th edition), Kutner, Nachtsheim, Neter

NOTE: Only ONE of the above texts is required.

Grading:
- Midterms (4 and cumulative) 20% each (Friday 9/26, Friday 10/17, Friday 11/7, and Friday 12/5)
Individual Project: 20% due at beginning of scheduled final exam time – NOTE: Do NOT make plans to leave early without knowing when this final exam is scheduled. NO consideration will be made for students who do not submit a project as scheduled.

There is no assignment homework but some practice problems and their solutions are provided. You are expected to complete these problems.

**Calculator:** For exams and possibly quizzes, you will need a calculator that performs exponentials, square roots, logs and powers. A cell phone calculator is NOT acceptable!

**Midterms:** The exams will be given on the dates listed above. The midterms will be paper-based exams that may include some work using Minitab. You MUST take the exams during your scheduled class time. You will only be allowed to use a pen/pencil, one page (front and back) handwritten sheet of notes, and a calculator - A cell phone calculator is NOT acceptable. Your one page of notes will be collected with your exam so please include your name and userID (e.g. abc123) on this page of notes. You are NOT permitted to use the web for help. The only web access you will be allowed, if instructed, is ANGEL. The page of notes must contain only content delivered during lectures this semester and CANNOT include any information from prior exams (this semester or prior).

**Individual Project:** The project will replace the final exam. Each student will find an interesting linear regression or binary regression data set from his or her own area of research or personal interest, analyze it, and write a report on it. The projects will be completed on an individual-student basis. The project must have a full discussion of interpretations (including graphs), not just a statement of results. The project will be due by the beginning of our scheduled final exam as scheduled by the Registrar. You will make a submission to the drop box located inside the Individual Projects folder located on the Lessons page in our course in ANGEL. You will submit in Word document form your report as well as an Excel copy of the data used in the analysis. **Also, a hard copy of your project will be turned in at the beginning of the scheduled final exam.** Project rules and expectations are also located inside this folder.

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**Collaboration:** Although you are expected to complete the work on your own, I understand that a certain amount of collaboration may occur. However, you must turn in your own work, which presumably reflects your understanding of the material. Please consult the Penn State Academic Integrity Policy at: [http://www.science.psu.edu/academic/Integrity/index.html](http://www.science.psu.edu/academic/Integrity/index.html)

**LECTURE TOPICS**

Useful review information can be found in Appendix A of Kutner et al.
Intro and Statistical Review: Read Chapter 1 of Kutner et al.
Regression Inference: Read Sections 2.1, 2.2 and 2.3 of Kutner et al.
Inference on Mean Response and Prediction: Read Sections 2.4, 2.5 and 2.6 of Kutner et al.
ANOVA and General Linear Test: Read Sections 2.7 and 2.8 of Kutner et al.
Coefficient of Determination: Read Section 2.9 of Kutner et al.
Residual Graphics and Diagnostics: Read Sections 3.1, 3.2 and 3.3 of Kutner et al.
Residual Diagnostic Tests: Read Sections 3.4, 3.5 and 3.6 of Kutner et al.
Lack of Fit Test: Read Section 3.7 of Kutner et al.
Remedial Measures e.g. Transformations: Read Sections 3.8 and 3.9 of Kutner et al.
Simultaneous Inference: Read Sections 4.1, 4.2 and 4.3 of Kutner et al.
Regression in Matrix Form: Read Chapter 5 of Kutner et al.
Multiple Regression (including dummy variables): Content here is from Chapters 6 and 8 of Kutner et al.
Model Selection: Read Chapter 9 of Kutner et al.
Influence, Leverage, and Multicollinearity: Read Chapter 10 of Kutner et al.
Remedial Measures Influence, Leverage, and Multicollinearity: Read Chapter 11.1 of Kutner et al.
Non-linear (Logistic) Regression: Read Chapter 13 of Kutner et al.
Analysis of Covariance (ANCOVA): Only in fifth edition of texts listed above