**Syllabus for STAT 502 --- Analysis of Variance and Design of Experiments**

Penn State World Campus -- Spring 2016

**Instructor**: Dr. Kwame Kankam

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Contact preference: ANGEL mailbox and Piazza discussion boards. Video and phone chats are available on request.

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**Prerequisites:**

* Stat 462 or Stat 501

**Textbook**:

* Our text is a custom printing, Stat 502, ISBN 9781121669376 published by McGraw Hill. It is the second half of Applied Linear Statistical Models, 5th edition by Kutner, Nachtsheim, Neter, and Li.

**Software**:

* Students may use SAS, Minitab, SPSS or R. However, note that the online notes will only include instructions on fitting models in SAS or Minitab. SAS and Minitab are available at no charge through the Penn State WebApps site: <http://webapps.psu.edu>.
* Students may prefer to have a copy of these applications on the computer they will be using for the course. To find out more about where to get these applications, go to the department’s statistical software page: <http://stat.psu.edu/education/statistical-software-packages>

**Course Description:**

This is a course in applied analysis of variance (ANOVA) and analysis of covariance (ANCOVA), including randomization and blocking, single factor and multiple factor designs, categorical and quantitative factors, multiple comparisons, fixed and random effects, balanced and unbalanced designs, block designs, split-plot, repeated measures, and crossover designs.

**Learning Objectives:**

As a result of successful participation in this course students will be able to:

* Manipulate datasets in preparation for ANOVA
* Recognize elements of treatment designs
* Differentiate between fixed and random effects
* Understand and be able to recognize blocking variables
* Construct appropriate ANOVA statistical models for experimental settings
* Include continuous covariates for ANCOVA
* Analyze repeated measures in ANOVA
* Apply concepts that are introduced in the class to advanced models

**Grading**

* Homework – 30%
* Exams – 60% (30% for two midterms and 30% for Final)
* Project – 10%

Grading Scale cutoffs are as follows: A, 92% or better; A-, 90; B+, 87%; B, 82%; B-, 80%; C+, 77%; C,70%; D,60%.

**Communication:**

* All communication with your instructor and/or teaching assistant must take place through the email system in the course management system (ANGEL) or through the Piazza discussion forum. Emails sent outside of ANGEL will not be answered. If your ANGEL email is forwarded to another email account, replying through the other account is not accepted. You need to log into ANGEL to reply.
* I am usually able to respond within 24 hours. I will check my email and the discussion boards regularly. Please keep in mind that questions asked less than 24 hours before the deadline may go unanswered and it is the student’s responsibility to turn in the assignments on time.
* I am available to provide help through Skype/Facetime/etc for those that need. If would like to arrange a phone call or video session with me, please send me the details of times you are available and how you may be reached.

**Participation:**

Participation on the discussion forum is strongly encouraged. We will be using Piazza for our discussions. There is a link to Piazza in Angel. Participation also includes emails sent to the instructor with questions pertaining to the course material.

**Lessons and Homework:**

The online lesson notes describe methodology and also provide worked examples. Homework assignments will include problems that are similar to worked examples from the lessons, but will also include ‘challenges’ that require extending the concepts to new experimental situations. Homework problems may also include application (and interpretation) of the lecture material to experimental situations that arise in your area of academic interest.

Homework (HW) is due by 12:00 midnight EST every Tuesday. To be clear, 12:00 midnight Tuesday would be between 11:59 PM Tuesday and 12:05AM Wednesday. There will be a 24-hour ‘grace period’ wherein late homework assignments can be submitted to the dropbox but will be penalized by a 10% grade reduction. Any homework submitted after the 24 hour grace period will NOT be graded. You are encouraged to discuss homework problems with classmates via the Piazza discussion boards. We will monitor these (as well as course email) daily Monday-Friday and weekends as possible to respond to questions as they arise. For homework questions, if two answers are provided, the incorrect one will be graded. Homework solutions will be posted following completing of grading.

Submissions of Homework or Exams is done through a dropbox in ANGEL provided with the assignment. These will consist of a single file, preferably a Word document or pdf file.

Lastly, one important part of an ANOVA course is the model statements. For all the designs we discuss, the book and the notes contain model statements. Since the model statements are so important, we may ask you to give them on homework assignments or tests. As mentioned above, you’ll need a way to write Greek letters, subscripts, and simple algebraic expressions. Microsoft Word will do this by using the Insert > Equation function. With a little practice, this is not difficult to work with.

**Exams:**

There will be two open book midterm exams, and a proctored comprehensive final exam. Students are expected to do their own work on exams and no discussion forum will be available for the exams. During the exams, clarification questions need to be emailed to the instructor, and (where appropriate) replies will be copied to all students. For exam questions, if two answers are provided, the incorrect one will be graded. Exam solutions will be posted following completion of grading, and any questions regarding grading of exams need to be submitted by email within one week of the posting of the exam grades.

**Course Project:**

The project is an opportunity for you to work on a problem from your own area of application, by utilizing methods and tools for ANOVA or ANCOVA. You can work on your own or in groups of 2 or 3, and will need to submit a proposal to ensure that the project is acceptable for this course. You will either submit a 20min online presentation or a short written report no more than 5 pages. More information is provided on ANGEL. The project must have a full discussion of interpretations (including graphs), not just a statement of results.

**Accommodations for Students with Disabilities:**

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at <http://equity.psu.edu/ods/> .

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at <http://equity.psu.edu/ods/student-information> ). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

**Academic Integrity**

All Penn State policies regarding ethics and honorable behavior apply to this course. Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. All University policies regarding academic integrity apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students.

For any material or ideas obtained from other sources, such as the text or things you see on the web, in the library, etc., a source reference must be given. Direct quotes from any source must be identified as such.

All exam answers must be your own, and you must not provide any assistance to other students during exams. Any instances of academic dishonesty WILL be pursued under the [University and Eberly College of Science regulations](http://www.science.psu.edu/academic/Integrity/index.html) concerning academic integrity. For more information on academic integrity, see [Penn State's statement on plagiarism and academic dishonesty](http://tlt.its.psu.edu/suggestions/cyberplag/cyberplagstudent.html) .

[The Eberly College of Science Code of Mutual Respect and Cooperation](http://science.psu.edu/climate/code-of-mutual-respect-and-cooperation/Code-of-Mutual-Respect%20final.pdf/view) embodies the values that we hope our faculty, staff, and students possess and will endorse to make The Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.