



STA 4211 (20296)

Fall 2018

Design of Experiments

MWF 3rd period 09:35-10:25, FLO 100

Instructor: Demetris Athienitis

Office: Griffin Floyd 116B

E-mail: athienit@ufl.edu

Teaching Assistant: Jiayuan Zhou

Office: See office in e-Learning under “Pages”

E-mail: zhou.j@ufl.edu

Course Website: [e-Learning](#)

Course Notes: http://users.stat.ufl.edu/~athienit/STA4211/class_notes_4211.pdf

Course Communication:

- Discussion forum in Canvas.
- Office hours (posted under “Pages” in Canvas).
- E-mail for questions regarding course policies. (Ensure that **4211** is in the subject line. Failure to do so may result in a non-response.)

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussion and chats. Please refer to [expected class netiquette](#).

The instructor reserves the right to update any parts of this syllabus as necessary.

Students will promptly be notified of any changes.

Required Text(s): *Applied Linear Statistical Models*, 5th Edition (Chapters 15-30)

Author(s): M. Kutner, C. Nachtsheim, J. Neter and W. Li, **ISBN-13:** 9780073108742

Course Description: This course provides an introduction to the design and analysis of statistical experiments. Experimental design techniques are used in a wide variety of academic, industrial, and scientific areas. We will cover widely used designs, and discuss practical and computational issues regarding their analysis.

Since this course is a capstone course there will be two other components that will contribute to your grade. Sometime before spring break you will take a 20 point ALC Exam (20 multiple choice questions) testing your knowledge of [fundamental concepts in applied statistics](#) as well as a mandatory survey. Near the end of the semester, there will be a data analysis project and

presentation. Each student will design and conduct their own experiment and then analyze the data addressing an issue of interest to them. Each student will submit a written report, describing their experiment and results, as well as giving an oral presentation to the class. This will be worth 40 points using the following [grading rubric](#). More on these later in the course (which will also be posted on the class website).

Prerequisite(s): STA 4210

Credit Hours: 3

Software: You will need a computer for the homework assignments and practise. There will not be any lessons on how to use software, but questions are welcomed especially in office hours. The main software used in class will be [R](#). You can use other software if you wish as long as you yield similar results: Minitab is a user-friendly alternative, SPSS, SAS, JMP, Matlab etc. For more help visit <http://www.stat.ufl.edu/~athienit/software.html>

Purpose of Course: Investigate the purposes, methods, designs and applications of statistical experimental design techniques. Emphasis is on what to apply and why it works.

Course Goals and Objectives:

1. Access, manipulate and analyse data using statistical software.
2. Acquaint students with Least Square methods and concept of linear regression, correlation, and its applications.
3. To approach the material with matrices algebra.
4. Develop the ability to identify different experimental designs and properly analyze the data for each design.
5. Acquaint students with transformations, qualitative variable in the model which broaden the use of linear model theory.

Course Policies

Assignments

- Students are expected to work independently, unless otherwise specified in writing. **Offering** and **accepting** solutions from others is an act of **plagiarism**, which is a serious offense and **all involved parties will be penalized according to the Academic Honesty Policy**. Discussion amongst students is encouraged, but when in doubt, direct your questions to the instructor or teaching assistant.
- **No late assignments will be accepted under any circumstances.**
- Students are expected to show and explain how the answers were obtained. When asked to submit textbook problems/exercises, simply copying the solution manual without performing, showing and explaining your work is not sufficient for a grade and may be considered an act of plagiarism. (There are software to test for plagiarism).
- All electronically **submitted work must be in pdf format** or a standard file format such as doc, jpeg, etc.

Homework/Quizzes

There will be homework assigned on a regular basis as *suggested homework* (not to be turned in) containing data analysis problems and/or book exercises. Suggested homework will be posted under “Assignments”.

A *timed* quiz assignment based on the topics covered in class (and loosely based on the suggested homework) will be administered the day of the suggested homework deadline as either

- In-class (closed notes).
- Online (Only 1 attempt. It is highly encouraged to use a **reliable device** with a **reliable wired ethernet internet connection**. As soon as work is submitted a grade of 0 will show up as a placeholder until the assignment is graded.)

but which format will not be announced prior. For the best preparation students are encouraged to complete the full suggested homework set by the deadline posted on the suggested homework, indicating when you should be ready to take the quiz.

Solutions to suggested homework will not be posted, but solutions to the quizzes will be.

Exams

There will be three (3) in-class exams that may comprise of multiple choice questions and/or open-ended questions (usually open-ended). Exams will emphasize more on conceptual questions while HW/Quizzes will be more computational (not always).

Allowed material:

- Double sided, one page formula sheet of your own creation not to exceed the dimensions of 260mm by 330mm (normal letter sized page). Only formulas are allowed on the formula sheet. Failure to adhere to these conditions may result in failing the assignment. Provided is an example of a [proper formula sheet](#).
- Scientific/Graphing Calculator.

Important dates:

ALC Exam	September 7
Exam #1	September 21
Exam #2	October 26
Project proposal	October 29
Project deadline	December 5
Project presentation	possibly December 10
Exam #3	December 12 at 12:30

Grading

Change of grade: Grades will be changed only when an error has been made by the instructor.

Grade distribution:

Exams 1, 2 and 3	(10% lowest, 26% second best, 28% best)
Homework/Quizzes	20% (lowest 1 score is dropped but subject to change)
ALC Exam (and Survey)	5%
Project proposal	1%
Project	10%

Letter grade distribution:

	A	91 to 100	A-	88 to < 91	
B+	84 to < 88	B	80 to < 84	B-	77 to < 80
C+	74 to < 77	C	70 to < 74	C-	67 to < 70
D+	64 to < 67	D	60 to < 64	D-	55 to < 60
E	< 55				

Final grades shown on Canvas are not accurate because they do not account for the conditional weighing of exams and quizzes.

Final grade can be calculated with exams as a % (out of 100) and quizzes out of 10 points

$$0.10(\text{worst}) + 0.25(\text{second best}) + 0.30(\text{best}) + 0.20(100) \frac{\sum \text{quizzes} - \sum \text{two lowest}}{10(\# \text{ of quizzes} - \# \text{ of drops})} + 0.05(\text{ALC as \%}) + 0.10(\text{Project as \%})$$

There will be *no rounding up* of scores. Students who actively participate in the discussion forum will be awarded **extra credit** (to the discretion of the instructor not to exceed 1 final point). To view the result of the letter grades to your GPA please visit

<http://www.registrar.ufl.edu/catalog1011/policies/regulationgrades.html>

Make-up policy: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

(Additional) Make-up policy requirements:

- Every effort should be made to complete the assignment/exam during the open period. Only extreme situations will warrant a makeup. Contact the instructor prior to the exam - as soon as you realize you will be unable to take the assignment/exam at the scheduled time. Each case will be reviewed individually. Valid and detailed documentation is a prerequisite for scheduling a makeup under such extenuating circumstances.
- If you have an emergency on the day of the assignment/exam, the instructor must be contacted by midnight of the day of the assignment/exam.
- Make-ups need to be scheduled within a week from the assignment deadline. Student is responsible for scheduling.
- Additional Note: Being on vacation or booking a trip prior to the completion of the semester is not a valid reason to request a makeup. Please reference the [Academic Calendar](#)

Incomplete: An incomplete grade may be assigned at the discretion of the instructor as an interim grade for a course in which the student has completed a major portion of the course with a passing grade, been unable to complete course requirements before the end of the term because of

extenuating circumstances, and obtained agreement from the instructor and arranged for resolution of the incomplete grade in the next term. Instructors are not required to assign incomplete grades. For complete details please visit [CLAS incomplete grade policies and forms](#).

Electronic devices

During class time, only laptops and tablets are allowed. Cell phones, smartphones, and phablets are not permissible unless otherwise specified by the instructor. A student found using said device during class time will be asked to leave the classroom which may result in missing any remaining assignments administered during class time.

Getting help

For issues with technical difficulties for e-learning in Canvas, please contact the UF Help desk via Canvas “Help” tab or <https://my.it.ufl.edu/CherwellPortal/UFITServicePortal>

Any requests for make-ups due to technical issues MUST be accompanied by the **ticket number** received from e-Learning when the problem is reported to them. The ticket number will document the time and date of the problem. You MUST contact your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Complaints/Praises: Should you have any complaints/praises with your experience in this course you can always address them to the instructor at athienit@ufl.edu, or you may contact the Department of Statistics to submit a complaint. You may submit anonymous e-mail.

For complaints that are not satisfactorily resolved at the department level or which seem to be broader than one department, students are encouraged to review the [UF Complaints Policy](#).

UF Policies

Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the [Dean of Students Office](#). The Dean of Students will provide documentation to the students who must then provide this documentation to the instructor when requesting information. You must submit this documentation prior to submitting any assignments for which you are requesting accommodation.

Academic Misconduct: Students are held accountable to the [UF Honor Code](#).

Evaluations: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

Tentative Course Outline

The course will cover chapters 15-30 in the text.

Chapter	Content	Textbook	HW/Quiz
15	Introduction to Design	Ch 15	1
16, 17, 18	Completely Randomized Design	16.1-16.11,17.1-17.8,18.1-18.7	2
Exam 1			
19	Two Factor Studies, equal sample size	19.1-19.10	3
20, 23	Two Factor Studies, one case per trt and unequal sizes	20.1-20.2, 23.1-23.3	4
24	Multi Factor Studies	24.1-24.5	5
27	Randomized Complete Block/Repeated Measures	27.1-27.2	6
28	Latin Square	28.3-28.5	7
Exam 2			
25	Random and Mixed Effects Models	25.1-25.4	8
22	Analysis of Covariance	22.1-22.4	9
26, 27	Split Plot/Nested Models/Repeated Measures	27.6, 26.1-26.5	10
30*	Response Surface Methodology*	30.1-30.2*	11*
Exam 3			

* Time Permitting, but probably not