

## AG 505 and AG 506 - Syllabus for Spring Semester 2013

### **Experimental Design and Data Analysis of Biological Experiments**

4 Credit Hours (3 class, 1 lab)

Instructor: Dr. Jim Heitholt

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Meets at 2 pm to 6 pm Tuesdays (AgIT 255)

#### **A. Objectives (the student will be able to):**

1. Describe the three major characteristics of a scientific experiment.
2. Calculate variance and standard deviation from a data set.
3. Perform a  $t$ -test to determine whether means are significantly different.
4. Explain the difference between CRD, RCB, and LS.
5. Be able to select the correct error term when performing an  $F$ -test on the effects of selected sources of variation.
6. Explain the assumptions necessary to perform an ANOVA.
7. Construct a regression analysis table to describe the relationship between two variables.
8. Describe the appropriate ways to transform data that are not normally distributed.

#### **B Course Outline**

15 Jan	Experimental Principles Basic Statistics
22 Jan	Data Summary Normal Distribution
29 Jan	$t$ -Distribution Confidence Intervals
05 Feb	Hypothesis Testing Comparisons of Two Means ( <i>receive Test 1</i> )
12 Feb	Linear Regression Multiple Regression
19 Feb	Analysis of Variance (ANOVA) ( <i>Test 1 due</i> )

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26 Feb	Completely Randomized Design (CRD) <i>Receive test 2</i> Randomized Complete Block (RCB) Design
5 March	Latin Square (LS) Factorial Experiments
19 March	Comparison of Multiple Treatment Means Other Mean Comparisons ( <i>Test 2 due</i> )
26 March	Assumptions Data Transformation
2 April	Missing Values, Split Plot Designs
9 April	Comparing Regression Lines Analysis of Covariance
16 April	Analysis of Counts Non-Parametric Methods
23 April	Proc NPAR1WAY
30 April	Proc Mixed, GLIMMIX
<b>7 May</b>	<b>Final Exam Week (test 3)</b>

Each student will be provided a TI-36 calculator capable of displaying means, standard deviation, variance, and correlation coefficients. Two mid-semester take-home exams will account for 67% of the grade (100 points or 33% each) and the final (in-class) will account for 33% of the grade.

#### **References:**

Clewer, A.G. and D.H. Scarisbrick. 2001. Practical Statistics and Experimental Design for Plant and Crop Science. John Wiley and Sons, LTD. New York

Morris, T.R. 1999. Experimental Design and Analysis in Animal Sciences. CABI Publishing, New York

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### **Experimental Design and Data Analysis of Biological Experiments**

#### **Student Learning Outcomes**

Students will be able to design a factorial greenhouse experiment with two levels of factor A and three levels of factor B, and perform a correct ANOVA on a set of dummy data.

#### **Evaluation**

**Undergrad:** 300 points. Three take-home tests, one in-class (all 100 points each).

**Grad:** 400 points Same as above but with a 100 point independent project.

Participation in lab exercises is required. Grade assignment, 90+ = A, 80-89 = B, 70-79 = C, below 70 = F

#### **Attendance**

Attendance for this class is **mandatory**. Attendance will be confirmed with evaluation sheets. Each unexcused absence will result in the lowering of your final grade by one letter grade.

#### **Student Conduct**

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment.

Students are expected to respect the rights of others in the class. Cell phones and other electronic equipment should be turned off prior to the beginning of class. Use of these items during class time, or any other unwarranted classroom disruption, will result in your immediate excusal from class for the remainder of the period.

You may bring drinks to class. Please finish any meals before class begins. The use of tobacco products during class time is strictly prohibited.

#### **Academic Honesty and Integrity**

Cheating of any kind will not be tolerated. Copying of others' work, use of disallowed material, plagiarism in assignments, or cheating in any other form as defined by the instructor will result in a grade of zero for that assignment. Multiple infractions will result in a grade of 'F' for the course.

## AG 505 and AG 506 - Syllabus for Spring 2013 (continued)

### **Experimental Design and Data Analysis of Biological Experiments**

Students are expected to do their own work except where specifically allowed to work together. Assistance with written assignments, such as proofreading or editing, is encouraged as long as the final concepts and product are those drafted and authored by the student. Information or materials (including ideas, quotes, data, procedures, etc.) from sources other than the student must be given proper credit through appropriate citation. The discipline of Agricultural Education uses the APA format (5<sup>th</sup> edition) as its primary style guide for publications, including research papers and reports. Assistance with this format and general guidelines for written assignments are available at the following two sources:

The Online Writing Lab at Purdue University

<http://owl.english.purdue.edu/owl/resource/560/01/>

The Writing Center @ TAMU-Commerce

<http://www.tamu-commerce.edu/litlang/CSC/index.htm>

Academic honesty and integrity is expected of all students. Cheating including but not limited to copying, talking to classmates during testing, using notes when prohibited by instructor, and plagiarism (as defined by the Council of Writing Program Administrators <http://www.wpacouncil.org/node/9>) will not be tolerated. Penalties may include grade reduction or suspension from class, depending on the frequency and severity of the violation.

#### **Students with Disabilities:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Requests from students with disabilities for reasonable accommodations must go through the Academic Support Committee. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce

Halladay Student Services Building

Room 303 A/D

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

[StudentDisabilityServices@tamu-commerce.edu](mailto:StudentDisabilityServices@tamu-commerce.edu)

## **Experimental Design and Data Analysis of Biological Experiments**

### **Civility Statement - Professionalism**

Students are expected to attend class and/or laboratory as scheduled. Their participation in class discussion and instructional activities should follow the basic principles of common courtesy, decency, and cooperation with peers and instructional personnel. Rude and disruptive behavior, as well as cheating, in any form, will not be tolerated. The use of tobacco products in the classroom, laboratory, or field trip sites is prohibited.

Inappropriate conduct will not be tolerated. Failure to comply with instructor's guidelines may result in suspension from class for the remainder of the day's instruction. Repeat offenses may result in additional consequences.

*Requests from students with disabilities for reasonable accommodations must go through the Academic Support Committee. For information call Advisement Services at 903-886-5133.*