COURSE GRADING

3 Credit hours. The final course grade will be determined as follows:

1st Hour Exam = 20%	Homework Assignments = 40%
2nd Hour Exam = 20%	For students enrolled in PS561, the term
Final Exam = 20%	paper will count as 25% of the homework grade.

For students in PS561, final letter grades will be assigned on the basis of final course averages as follows:

90.0 – 100 = A	70.0 - 77.9 = C
88.0 – 89.9 = B+	60.0 – 69.9 = D
80.0 – 87.9 = B	<60.0 = F
78.0 – 79.9 = C+	

For students enrolled in PS461, the final course letter grade scale will be determined on the basis of the widest breaks (in close approximation to the above scale) in the distribution of final averages of everyone enrolled in PS461.

HOMEWORK ASSIGNMENTS

There will be a homework assignment for most of the topics covered during the semester. Homework **not** turned in on the due date will be penalized 5% for each day of delay after the due date. Students may work together on homework assignments; however it is critical that you fully understand the solutions to homework assignments since exam questions are very similar to homework questions.

MAKE – UP EXAMS

No make-up exam will be given without 1) a written medical excuse from the attending physician or nurse in case of sickness or 2) a written excuse from your advisor prior to the exam, listing the official function (i.e. research responsibility, judging trip, etc) which necessitates you missing the examination**.**

If make-up examinations are necessary, only one will be given for each examination, according to the following schedule:
1st hour exam make-up –Friday, October 2, 7:00 - 7:50 pm
2nd hour exam make-up – Monday, November 2, 7:00 – 7:50 pm
Final exam make-up: to be determined
Any student who misses an exam must have approval from the instructor to take a make-up exam advance of the above scheduled times.

ACADEMIC DISHONESTY

Academic dishonesty will not be tolerated. Appropriate action, as outlined in *Hilltopics* will be taken in all cases of academic dishonesty identified by the instructor.

Plant Sciences 461/561
Statistics for Biological Research

INSTRUCTOR: Dennis West
                 350 Ellington Hall
                 Phone 974-8826   Email dwest3@utk.edu

OFFICE HOURS: If my door is open, come in and visit. During the fall semester I am
                 busy with field research. You may need to make an appointment
                 for a specific date/time to see me.

CLASS SCHEDULE: 8:00 – 8:50 am, Monday – Wednesday – Friday
                 Room 160 Plant Biotechnology Building

PREREQUISITE:
         Math 125 or equivalent

PREMISES:

   (a)   Students enrolled in this course have not been exposed to any statistical
             computational procedures previously;
   (b)   This course should acquaint students with elementary methods of analyzing and
             interpreting data after the data have been collected;
   (c)   Minimum emphasis will be given in this course to designing experiments
             leading to the collection of data.

OBJECTIVES: Upon completion of this course, students should be able to:

(1)   Recognize and explain the symbolism, notation, and vocabulary used to define or
         describe statistical terms or procedures;
(2)   Apply and explain the basic methods of describing and analyzing data and
         provide proper interpretation of the results;
(3)   Demonstrate sufficient knowledge of basic statistical results presented in the literature
         of their respective areas of specialization, and be able to communicate with a statistician
         for more complex applications of statistics;
(4)   Demonstrate adequate statistical knowledge to enter advanced statistics courses.

Student requirements:
Attend every class meeting and keep up with homework assignments and reading suggestions.
You will need a calculator for homework and examinations. A cheap calculator with a square
root function and one memory is adequate for the first half of the course. You may use a
calculator during exams, however you will **NOT** be allowed to use phones, laptop computers,
or other personal data devices as calculators on exams. During the second half of the course we
will use the statistical software package SAS (Statistical Analysis System). Many of you have
access to computers with SAS installed in your office or laboratory. SAS can also be accessed
via the internet, and you will be given instructions for that at a later time. Please turn your
personal communication devices off during class to avoid annoying your instructor and fellow
students. Students enrolled in PS 561 must complete a term paper for course credit. No extra
credit or additional work will be allowed to make up missed class assignments.

Text: <u>An Introduction to Statistical Methods and Data Analysis</u> (4th ed), Ott. (not required)

Additional References (on reserve in Ag. Vet. Med. Library):
(1) Elements of Statistical Inference (6th ed), Huntsberger and Billingsly (HB).
(2) Principles and Procedures of Statistics, Steele, Torrie, & Dickey (ST).
(3) Agricultural Experimentation, Little and Hills (LH)
(4) Statistical Procedures for Agricultural Research, Gomez and Gomez (GG).

There is a handout for almost every topic covered during the semester. Most of these handouts contain numerical examples which are different from those used in the lectures. You will also be provided statistical tables.

<u>Month Day</u>		<u>Topic</u>	<u>Reading Assignment</u>
Aug	19 W	Introduction	Ch. 1
	21 F	Notation and Symbolism	Ch. 2
	24 M	Descriptive Statistics Measures of Location	Ch. 3
	26 W	Descriptive Statistics Measures of Dispersion	
	28 F	Probability	Sec. 4.1-4.4
	31 M	Instructional Day	
Sep	2 W	Binomial Equation	Sec. 4.7-4.8
	4 F	Distributions - Binomial and Poisson	Sec. 8.6
	7 M	Distributions - Normal	Sec. 4.9-4.10
	9 W	Distributions - Standardized Normal	
	11 F	Confidence Interval About the Mean (μ)	Sec.5.1-5.2
	14 M	C.I. about μ continued	
	16 W	Formulating and Testing Hypotheses	
	18 F	Inferences about the Population Mean -'t' Test	Sec. 5.5-5.7
	21 M	Continuation of 't' Tests	Sec. 6.1-6.5
	23 W	Continuation of 't' Tests	Sec. 6.1-6.5
	25 F	Analyzing Categorical Data - Chi-Square Tests	Sec. 8.1-8.5
	28 M	Continuation of Chi-square Test	Sec. 8.7-8.10, GG Ch. 10
	30 W	**EXAM 1**	
Oct	2 F	Basic Principles of Experimentation	ST Ch. 6
	5 M	Basic Principles of Experimentation (con't)	GG Ch. 1
	7 W	Analysis of Variance (ANOVA)	Ch. 13
	9 F	One Criterion of Classification	LH Ch. 4
		Completely Randomized Design (CRD)	
		The Linear Additive model	
	12 M	Continuation of CRD ANOVA	
		The F test and expected mean squares	Ch. 17, Ch. 11
	14 W	Introduction to SAS software for data analysis	
	16 F	Introduction to SAS	
	19 M	ANOVA, 2 criteria of classification	Sec. 15.3
		Randomized Complete Block Design (RCB) LH	Ch. 5, GG Ch. 2
	21 W	Continuation of RCB	Ch. 14
	23 F	Mean Separation Procedures - Least	ST Ch. 7
		Significant Difference (LSD_α)	

Continued,

	26 M	Mean Separation - Duncan's Multiple Range Test (DMRT)	
	28 W	Mean Separation - Honest Significant Difference (HSD)	
		or Tukey's w-Procedure and Student-Newman- Kuels Test	
	30 F	**EXAM II**	
Nov	2 M	Factorial Arrangement of Treatments	Sec. 15.5-15.6
	4 W	Continuation of Factorials	GG Ch. 3
	6 F	Linear Regression	Sec. 9.1-9.4
	9 M	Continuation of Linear Regression	Ch. 10
	11 W	Simple Correlation	Sec. 9.5
	13 F	Correlation continued	
	16 M	Split-plot Experiments	ST Ch 12
	18 W	Continuation of Split-Plot Experiments	
		Term paper due for graduate credit	
	20 F	Split-Plot Experiments, Expected mean squares	
	23 M	Split-plots in time and space or Final Exam	
		Final Examination	

NOTE: All reading assignments are in the text by Ott unless indicated otherwise.

Examinations will be given as near the scheduled date as possible, however unforeseen circumstances sometimes require changing the exam dates.