

**Course Syllabus for
PLSC 724 - FIELD DESIGN I (3 credits)
Fall Semester - 2023**

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Course Description: PLSC 724 is a lecture course that discusses different statistical techniques for the analysis and interpretation of biological problems. Statistical techniques to be used include analysis of variance, simple linear regression, and simple correlation. Topics related to the planning of experiments to test hypotheses related to biological problems also are discussed.

Prerequisite: An introductory course in statistics

Required Text: There is no required text for the course, but below is a list of a few books that I have found useful.

Suggested Texts: Montgomery, D.C. 2019. Design and analysis of experiments, 10th edition. Wiley, New Jersey.

Gomez, K.A., and A.A. Gomez. 1984. Statistical procedures for agricultural research, 2nd edition. Wiley, New Jersey.

Steel, R.G., J.H. Torrie, and D.A. Dickey. 1996. Principles and procedures of statistics: a biometrical approach. McGraw-Hill Companies, New York.

Goals of PLSC 724: The broad goal for this course is to instruct students how to properly plan experiments, analyze data, and interpret results associated with testing hypotheses related to biological problems.

Outcome 1 Students will be able to comprehend concepts needed to plan experiments to test hypotheses. These concepts include experimental error, replication and its function, relative precision, error control, and randomization.

Outcome 2 Students will comprehend three experimental designs: completely random design, randomized complete block design, and Latin square design. For each design, students will know: the proper randomization procedure, how to describe the design, advantages and disadvantages, how to partition total degrees of freedom and sources of variation, the linear additive model, how to write expected mean squares, how to calculate estimates for missing data, how to do the analysis of variance, how to make tests of significance, and how to interpret results of significance.

Outcome 3 Students will be able to choose the correct experimental design to test hypotheses related to biological problems.

Outcome 4 Students will comprehend the use of simple linear regression to analyze and interpret results from experiments related to biological problems.

Outcome 5 Students will comprehend the use of simple correlation to analyze and interpret results from experiments related to biological problems.

Grading: Homework - ten homework assignments (15%)

Two lecture examinations (25% each)

Final exam - Comprehensive (35%)

Monday December 11, 8:00 am to 10:00 am

This course is graded on a curve. The level of difficulty of the examinations and homework determines the grade line for the curve. Yet, all scores of 90% or above are guaranteed an A, and scores of 80 to 89.9% are guaranteed a B.

Statement on Academic Honesty (see attachment for further details)

All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty

Statement on Students with Special Requirements (see attachment for further details)

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in the Lower Level of the NDSU Library (231-8463). <http://www.ndsu.edu/disabilityservices/>.

PLSC 724 TOPIC OUTLINE

STATISTICAL REVIEW

- Types of variables
- Populations vs. Samples
- Three measures of central tendency
- Three measures of dispersion
- Variance of the mean and standard error
- Coefficient of variation
- Linear additive model

PLANNING EXPERIMENTS

- Types of experiments
- Items to consider in planning experiments
- Experimental units
- Replication
- Choice of design
- Randomization

HYPOTHESIS TESTING

- Type I error
- Type II error
- Power of the test
- Steps in testing hypotheses
- Testing the hypothesis that μ is a specified value (*t*-test and confidence interval)

COMPARISONS INVOLVING TWO SAMPLE MEANS

- Two sample means with equal variance (*t*-test, confidence interval, and *F*-test)
- Two sample means with unequal variance (*t*-test)

COMPLETELY RANDOM DESIGN

- ANOVA for any number of groups with equal replication
- ANOVA for any number of groups with unequal replication
- ANOVA with sampling
- Linear models for CRD experiments
- Assumptions underlying ANOVA

MEAN COMPARISON TESTS

Least Significant difference (LSD)
Tukey's test
Testing effects suggested by the data
Orthogonal contrasts

RANDOMIZED COMPLETE BLOCK DESIGN

ANOVA for any number of treatments
ANOVA with sampling
Linear models for RCBD experiments
Experimental error in RCBD experiments

LATIN SQUARE DESIGN

ANOVA for single square
ANOVA for repeated squares

DIFFERENT ARRANGEMENTS USED IN EXPERIMENTAL DESIGNS

Factorial Arrangements
Split plot arrangements
Split block arrangements
Split-split plot arrangements

COMBINED ANALYSIS OF EXPERIMENTS

Combined analysis of experiments across locations
Combined analysis of experiments across years
Combined analysis of experiments across time and space

REGRESSION AND CORRELATION

Simple linear regression
Simple correlation
Transformations
Curve fitting

CAFSNR Syllabus Attachment – Fall 2023

Academic Honesty

The academic community is operated on the basis of honesty, integrity, and fair play. [NDSU Policy 335: Code of Academic Responsibility and Conduct](#) applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the [Office of Registration and Records](#). Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Students with special requirements

Any students with disabilities who need accommodations in this course are invited to share these concerns or requests with the instructor and contact the [Disability Services Office](#) as soon as possible.

Veterans and military personnel

Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible and are encouraged to provide Activation Orders.

Family Educational Rights and Privacy Act (FERPA)

Your personally identifiable information and educational records as they relate to this course are subject to [FERPA](#).

Important Dates (Full NDSU dates/deadlines can be found [here](#))

Aug 28	Last day to be added to Campus Connection Wait Lists
Aug 30	Last day to Add classes via Campus Connection* Permit needed after this date.
Aug 30	Last day for no-record Drop of classes @ 100% refund*(full semester classes only)
Aug 30	Last day to Withdraw to Zero Credits @ 100% refund*(full semester classes only)
Sep 4	HOLIDAY — Labor Day (no classes, offices closed)
Sep 5	Financial aid applied to NDSU account balances
Sep 6	Payments due for NDSU account balances
Sep 11	Last day to submit requests to Audit, Pass/Fail
Sep 29	Last day to Withdraw to Zero Credits @ 75% refund*(full semester classes only).
Oct 13	Grades of 'Incomplete' convert to 'F'
Oct 15	Late fees applied to unpaid account balances (11:59 p.m.)
Oct 26	Spring/Summer registration begins online based on total credits completed
Oct 29	Last day to Withdraw to Zero Credits @ 50% refund*(full semester classes only). No refunds issued for withdraw to zero credits after this date.
Nov 9	Last day to Drop classes with 'W' record
Nov 9	Last day to Withdraw to Zero Credits for Fall
Nov 10	HOLIDAY — Veterans Day Observed (no classes, offices closed)
Nov 17	Fall Commencement Participation deadline
Nov 22-24	HOLIDAY — Thanksgiving (no classes; offices closed Thursday, offices open

	Wednesday & Friday)
Dec 4-8	Dead Week
Dec 11-15	Final Examinations
Dec 15	Commencement ceremony

Well-being Resources on Campus and in the Community

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

For students on campus and remotely (telehealth):

- Counseling Services: 701-231-7671
- Center for accessibility and Disability Resources: 701-231-8463
- Student Health Service: 701-231-7331

In a crisis or emergency situation:

- Call University Police: 701-231-8998
- Call 988 Suicide and Crisis Lifeline
- Call 911
- Go to the Sanford Hospital Emergency Room at 5225 23rd Avenue S, 701-417-2100
- Go to Prairie St. Johns for a Needs Assessment: 701-476-721 (510 4th St. S)
- Call the FirstLink Help Line: 701-235-7335 SEEK Helpline or 2-1-1
- Call Rape and Abuse Crisis Center: 701-293-7273