**TPSS/ANSC 603 Experimental Design**

**Spring 2019** **3 credits**

**Instructor:** Michael Kantar, 204B St. John lab of Plant science, mbkantar@hawaii.edu

**Office hours:** by appointment

**Web resources:** <https://laulima.hawaii.edu>

**Textbook:**  No Text

**Optional Additional Reading:**

1. Gomez, K. A., and A. A. Gomez. 1984. Statistical Procedures for Agricultural Research, 2nd Ed. John Wiley and Sons, NY.
2. Snedecor, G. W., and W. G. Cochran. 1980. Statistical Methods, 7th Ed. Iowa State Univ. Press. Ames, IA.
3. Triola, M. F. 1995. Elementary Statistics, 6th Ed. Addison Wesley Publishing Co. Reading, MA.
4. Steel R.G.D., Torrie J.H. & Dickey D.A. (1997) Principles and Procedure of Statistics: A Biometrical Approach, 3rd edn. New York: McGraw Hill.
5. Lawson, John. 2014. Design and Analysis of Experiments with R. Chapman & Hall/CRC. Boca Raton, FL

**Course Purpose:** The purpose of this course is to prepare students to lean and implement principles in sampling, experimental design, and statistical analysis. By the end of the semester students will be able to:

* Understand terminology and basic principles of sampling, design and analysis
* Recognize the design of experiments in the literature
* Become familiar with computational packages such as R, SAS, SPSS etc.
* Generate a testable hypothesis
* Organize a sampling procedure and experimental design
* Analyze the results of experiments using appropriate procedures
* Be able to present methods, results, and interpretation of a spatial/temporal data set

**Course Audience:** This course is designed for upper division undergraduates or graduate students who are interested in experimental design.

**Attendance:** Attendance is essential for successful completion of the course. Please notify the instructors by email should you be unable to attend class.

**Grading**

|  |  |
| --- | --- |
| Activities | Percent of total grade |
| Course Homework | 72 |
| In class assignments | 8 |
| Final Presentation | 10 |
| Final Project | 10 |

**Letter Grade**

|  |  |
| --- | --- |
| A | 90% |
| B | 80-89% |
| C | 70-79% |
| Credit | 70-100% |
| No-credit | Less than 70% |

\*All students regardless of grading system chosen, are expected to complete all work assigned, a grade of incomplete will be given if assigned work has not completed by the end of the semester.

\*All assignments are expected to be completed and turned in on the assigned date. Late assignments will be graded but will decrease but the grade will decrease 10% for each day the assignment is late.

**Academic dishonesty and scholastic misconduct**

Academic dishonesty will not be tolerated for full definitions see UH Manoa policies.

**(**[**http://www.catalog.hawaii.edu/about-uh/campus-policies1.htm**](http://www.catalog.hawaii.edu/about-uh/campus-policies1.htm)**)**

**Disabilities**

Students with disabilities that impact their ability to participate in the course completely are encouraged to bring this to attention of instructors so accommodations can be arranged.

**Policy on makeup examination for legitimate absences**

Students should not be penalized for absence due to unavoidable or legitimate circumstances. It is the responsibility of the student to notify instructors as soon as possible of such circumstances so arrangements can be made.

*Schedule and milestones:*

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Topic** | **Lab/Homework** | **Milestone** |
| January 8 | Course Introduction | Introduction to Google Classroom | Introductions |
| January 10 | Research principles |  |  |
| January 15 | Introduction to R | Homework 1 |  |
| January 17 | Distribution and Descriptive Statistics |  |  |
| January 22 | R practice | Homework 2 | Homework 1 due |
| January 24 | Random sampling / required sampled sizes |  |  |
| January 29 | Completely Random Designs | Homework 3 | Homework 2 due |
| January 31 | ANOVA |  |  |
| February 5 | Residuals, diagnostics and transformations | Homework 4 | Homework 3 due |
| February 7 | Randomized Complete Block Designs |  |  |
| February 12 | Mean separation procedures | Homework 5 | Homework 4 due |
| February 14 | Contrasts |  |  |
| February 19 | Test for equal variance | Homework 6 | Homework 5 due |
| February 21 | Split Plots |  |  |
| February 26 | Combining Experiments | Homework 7 | Homework 6 due |
| February 28 | Split-Split Plots |  |  |
| March 4 | Factorial Designs | Homework 8 | Homework 7 due |
| March 6 | Latin Squares |  | Project Proposal due |
| March 12 | Augmented Designs | Homework 9 | Homework 8 due |
| March 14 | Class project |  |  |
| March 19 | Spring Break |
| March 21 |
| March 26 | No class Kuhio day |  |  |
| March 28 | Designs for Regression | Homework 10 | Homework 9 due |
| April 2 | Logistic Regression |  |  |
| April 4 | Poisson Regression | Homework 11 | Homework 10 due |
| April 9 | Survival Analysis |  |  |
| April 11 | ANCOVA | Homework 12 | Homework 11 due |
| April 16 | Linear mixed-effects models |  |  |
| April 18 | Non-Parametric Experiments |  | Homework 12 due |
| April 23 | Bootstrap |  |  |
| April 25 | Multivariate Designs |  |  |
| April 29 | Multivariate Designs |  |  |
| May 2 | Designs for large experiments |  |  |
| May 7 | Project Presentations |  |  |
| May 9 | Project Presentations |  |  |