



College of Health and Human Performance

Department of Exercise Sciences



BRIGHAM YOUNG UNIVERSITY
Department of Exercise Sciences

ExSc 631: Research Design in Exercise Science
Credit: Two (2) hours
Instructor: Larry Tucker, Ph.D.
Text: A Step-by-Step Approach to Using SAS for Univariate & Multivariate Statistics (2nd Ed) by O'Rourke, Hatcher & Stepanski (2005)
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Scientific research allows us to better understand truth. Knowledge of statistical methodologies helps us to interpret data collected as part of research projects. The focus of this course is on the understanding and application of a wide-variety of statistical procedures that are employed commonly in research and must be understood in order to interpret the literature.

Course Objectives:

After completing this course, students will be able to:

1. Define and explain the terminology associated with descriptive, univariate, and multivariate statistics on written essay exams.
2. Create a data set that can be analyzed using common statistical procedures.
3. Employ basic statistical procedures during take-home assignments and explain the meaning and application of the results.
4. Interpret statistical findings commonly used in the literature on take-home assignments and exams.

Exams:

Two exams will be given during the semester, one near the midterm and one during finals week. The test during finals week will include a unit test, a comprehensive exam, and a practical exam.

Attendance:

Regular attendance, punctuality, and active participation are expected of everyone. Because the class meets only once per week, absences are especially costly. More than two absences will result in a significant grade penalty. Two tardies will equal one absence.

Learning Activities

A. Create a data set (15 points)

Each student will create a data set using Excel. Your data set should include data lines (rows) for 120 make-believe subjects. The data for each subject should be on a separate line (row). The data set should include 60 men and 60 women. The data set should also include the following variables: Subject **ID** (1-120), **height** (in inches), **weight1** (baseline), **weight2** (midtest), **weight3** (posttest) [weight1,2,&3 should be in pounds; changes from weight1 to weight2, and weight2 to weight3 should be no more than \pm six lbs], **race** (Black, White, Hispanic, Asian, Other; label as 1-5), **group** (3 groups [1,2,3] 20 men in each group and 20 women in each group), **BF%** (range between 5% and 45%), **BMI** (range between 19 and 35), **activity** [pedometer measured daily steps] (range between 1500 and 15,000 daily steps), **fitness** [max VO₂] (range between 25 and 70 ml/kg/min), **LDL** cholesterol (range between 50 and 180 mg/dL), **HDL** cholesterol (range between 25 and 80 mg/dL), PLUS three additional variables of your choice. The name you give each variable should be

one word (see the bolded names above). For example, use “**LDL**,” not “LDL cholesterol.” Your Excel data set should be emailed as an attachment to me in the Excel (*.xls) format. Your last name should be part of the file name, such as tucker.xls. Data sets received late will be penalized significantly.

Due: 2nd class period

B. Analysis and Interpretation Assignments (5-15 points each)

Almost every week, students will have an out-of-class assignment. Most assignments will include some basic data analysis using a SAS statistical procedure discussed in class and interpretation of the results. The goal is not for you to become a SAS expert (the SAS code will be given to you). The goal is to expose you to a variety of useful statistical procedures, and help you to better interpret research findings in the literature. Some assignments will require acquisition of research articles and written interpretation of the statistical procedures and the results outlined in the articles.

Due: Each week, except the week of the midterm exam

GENERAL TOPICS OF THE COURSE

- Role of statistics in research
- Review of research designs
- Sources of variance
- Statistical significance, practical significance, meaningfulness
- Relationships among continuous variables—bivariate, multivariate, and curvilinear
- Relationships between categorical variables
- Epidemiologic strategies—the odds ratio and relative risk
- Least squares regression
- Partial correlation
- Developing prediction equations
- Differences among means—t-test, ANOVA, ANCOVA
- Choosing the correct statistic
- Statistical power

NOTES

1. End of the semester, April 15, 2008
2. Finals week begins April 18, 2008
2. Last regular day of this class, Th April 10, 2008
3. Homework assignments that are turned in the day after class or later will be penalized significantly, and the number of points lost will increase each day the assignment is late. Assignments are due at 8 am on Thursday—at the beginning of class. If the assignment is turned in later the same day, some points will be lost. Turn in your assignments on time! Remember, allow more than enough time to complete your assignments and double-check them. In short, it is best to complete your assignment several days before it is due.

FINAL GRADES:

Final grades for this course will be based on the total number of points earned from all graded material. Following is a close but not exact guide regarding how grades will be assigned at the conclusion of the semester. Half-grades (+ and -) will be assigned as appropriate.

90% + (A), 80-89% (B), 70-79% (C), 60-69% (D), < 60% (E)

Preventing Sexual Harassment

Title IX of the education amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the university but to students. If you encounter unlawful sexual harassment or gender-based discrimination, please talk to your professor; contact the campus EEO office (422-5895); or contact the honor code office (422-2847).

Students with Disabilities

Brigham Young University is committed to providing a working and learning atmosphere which reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the services for students with disabilities office (422-2767). Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the student and instructor by the SSD office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the equal employment office at 422-5895, D-282 ASB.