CTS 701
Intermediate Biostatistics
Creighton University
Department of Medicine
Spring 2015

Instructor: Ryan W. Walters, MS
Office: CHI Health CUMC 6727
Telephone: 402.280.3335
Website: http://tinyurl.com/WaltersCRES
Email: ryanwalters@creighton.edu
Office Hours: By Appointment (7am-5pm)

Course Description: This course will develop your ability to manage databases as well as conduct and interpret statistical analyses using SPSS (Statistical Package for the Social Sciences). This course is applied, employing a hands-on approach, where you will work with real datasets during the majority of your time in class. Further, as you progress through the semester you are encouraged to bring in your own datasets for examples, problem solving, and discussion.

Course Objectives: Upon successful completion of this course, you will be able to: (1) create and manage SPSS databases, (2) work through problems encountered frequently in database construction and management, (3) use SPSS to test assumptions and conduct statistical analyses, (4) interpret SPSS outputs, and (5) write up the results for publication.

Prerequisites: This course assumes you have a basic understanding of elementary statistics and had at least one graduate level course in the general linear model (e.g., CTS 601 or equivalent).

Methods of Teaching and Learning: As mentioned above, this class is designed to be extremely hands on. I believe the most effective mechanism for training you as applied researchers is to get your hands dirty so to speak; thus, lectures will be used sparingly in favor of tutorials, collaborative group work, class discussion, as well as in-class and homework assignments.

Required Textbooks: I have written the textbook for this course, which is downloadable from my Creighton website. This textbook will provide all material necessary to complete assignments and exams. If you prefer published SPSS how-to manuals, please consult the titles below:


Required Software: You are expected to have access to some version of SPSS (the current version is 22, but 7.5+ is acceptable). SPSS is available in several computer labs across campus, you can lease your own copy of the IBM SPSS Statistics Standard GradPack through SPSS’s website, with a 12-month lease costing around $100. However, SPSS’s GradPack has limited capabilities, so access to the full version is probably your best option.
**Attendance:** You are expected to attend all class sessions except as excused by me. In cases of obvious disinterest, as indicated by three absences without reason, you are subject to dismissal from this course by the Dean and you will receive an AF (absence failure) for the course. It is your responsibility to inform me of anticipated absences prior to the class session(s). If you miss a class session, it is your responsibility to obtain the material presented and discussed during the missed class session. This information may be obtained from your classmates or me. However, I will not repeat or attempt to discuss the missed session’s material with you unless you have generated your own specific questions from the missed class session.

**Assignments:** Assignments will challenge you to demonstrate skills you have acquired from the in-class tutorials and discussions. Assignments will be presented frequently throughout the course and are due by the beginning of the subsequent class period. If you know ahead of time that you will miss a class and an assignment is due, you must arrange to have this turned in early or completed before the particular class period the assignment is due. Each assignment is worth 25 points.

**Course Grade:** Final course grades will be calculated from the points you earn on assignments and exams (700 points total). The grading scale is provided below.

- A – 90% - 100%
- B – 80% - 89%
- C – 70% - 79%
- F – below 70%

**BlueLine:** The course web site may be accessed through BlueLine by entering your NetID and Blue password for the Username and Password fields, respectively. BlueLine is accessed at: https://blueline.instructure.com. Information available on BlueLine includes the course syllabus and discussion board (if necessary). I will notify you of additional information through the BlueLine communication e-mail service as needed. Please note that handouts will not be available on BlueLine, but are downloadable from my Creighton website.

**Academic Integrity:** All members of the University community share the responsibility and authority to challenge and make known acts of apparent academic dishonesty. Thus, if you are found to be participating in any form of academic dishonesty in this course you will be subject to sanctions described in the 2013-2014 Creighton University Student Handbook. It is your responsibility to become familiar with the definitions and disciplinary actions resulting from any form of academic dishonesty.

**Students with Special Needs:** Some students may have special needs, such as those with limited vision, impaired hearing, impaired mobility, or learning disabilities that interfere with their learning or performance on tests and assignments. If you feel you are such a student, please contact me right away and we can work together to request academic accommodations from the Office of Disability Accommodations (ODA), which is located in the Harper Center, Suite 4008, (402) 280-2749 (voice); (402) 280-5733 (TTY). Please note that you will be required to provide documentation of disability to the ODA prior to receiving accommodations, and that this written documentation must be provided by a qualified evaluator, as determined by the Director of the ODA, and should provide current recommendations for a postsecondary setting.
*Non-discrimination Policy:* Creighton University is an equal opportunity/affirmative action employer. Creighton University believes that each individual should be treated with respect and dignity. Any form of harassment or discrimination is a violation of human dignity, and Creighton strongly condemns any such harassment or discrimination. Whether verbal or physical, conduct of this sort violates another person’s rights and can create an intimidating, hostile, or offensive working or learning environment. Such conduct is subject to prompt and effective remedial action. If you believe you are a victim of harassment or discrimination you are encouraged to report the facts to the University to investigate and take corrective action where appropriate. Inquiries concerning the grievance procedure, affirmative action, or compliance with federal and state laws and guidelines should be addressed to John E. Pierce, Director of Affirmative Action, 2500 California Plaza, Omaha, NE 68178, (402) 280-3084.

*Disruptive Behavior:* Disruptive behavior includes, but is not limited to: talking, text messaging, excessive sleeping, and use of cell phones. If you demonstrate disruptive behavior during the class time, I may ask you to leave the classroom. Should this occur, you must see me after class. You will only be allowed to return following this meeting. Out of respect for your colleagues and as a demonstration of professional courtesy, all PDAs, cell phones, and pagers must be turned off during class.

*Email Policy:* Contacting me via email is great, but I cannot guarantee that I will be able to respond immediately. However, I will try to respond within 36-hours; excluding weekends, scheduled University breaks, and when I am out of town. If your email message is with regard to specifics of a missed class lecture(s) or involves specific details about a particular in-class assignment(s), a discussion of this nature is best conducted in person, so please schedule an appointment to meet with me.

*Course and Instructor Evaluations:* Evaluations will be anonymous and aggregated. Please note that while submitting these evaluations is not mandatory, I benefit from your comments and suggestions.
Content Outline

Introduction to SPSS
1. What SPSS allows you to do
2. What SPSS cannot do for you

Using SPSS
1. Data View
2. Variable View
3. Output
4. Syntax
5. Importing and Exporting Files
6. Merging SPSS files
7. Working with SPSS
   a. Identifying Duplicate Cases, Restructuring the Dataset, Recoding Variables, Date and Time Wizard

Descriptive Statistics
1. Frequencies, Split File, Select Cases, Compute Variable, Descriptives, Explore

Graphing
1. Bar Charts, Line Charts, Boxplots, Scatterplots

Statistical Analysis and Interpretation
1. Tests of Association
   a. Parametric: Pearson’s Product-Moment Correlation, Simple Linear Regression, Multivariable Linear Regression
   b. Nonparametric: Spearman’s Rho
2. Tests of Group Differences
   a. Parametric: One-Sample t-Test, Independent-Samples t-Test, One-Way Between-Subjects ANOVA, Factorial Between-Subjects ANOVA, One-Way Between-Subjects ANCOVA
   b. Nonparametric: Mann-Whitney Test, Median Test, Median Test, Kruskal-Wallis Test
3. Tests of Repeated Measurements (Longitudinal)
   a. Parametric: Paired Samples t-Test, One-Way Repeated-Measures ANOVA, Mixed Between-Within ANOVA
   b. Nonparametric: Wilcoxon Signed Ranks Test, Friedman’s Two-Way ANOVA by Ranks
4. Categorical Dependent Variables
   a. Pearson’s Chi-Square, McNemar Test of Change, Cochran Q Test, Simple Binary Logistic Regression, Multivariable Binary Logistic Regression
5. Time-to-Event
   a. Kaplan-Meier Analysis, Cox Regression both With and Without Time-Varying Covariates
Please note the following syllabus is only an outline of the planned timetable for this course and may change slightly as the semester progresses based on the needs of the class!!

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topic(s)</th>
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<tbody>
<tr>
<td>January</td>
<td>Introduction; Design Considerations; Overview of SPSS; Data View; Variable View; Output; Syntax; Entering Data; Importing Data from Various Sources</td>
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<tr>
<td></td>
<td>Exporting Data; Merging Files; Identifying Duplicate Cases; Restructuring the Dataset</td>
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<tr>
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<td>Recoding Variables; Date and Time Wizard; Frequencies; Split File; Select Cases; Compute Variable; Descriptives; z-Scores; Explore</td>
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<tr>
<td>February</td>
<td>Bar Charts; Line Charts; Boxplots; Scatterplots</td>
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<td>Design Considerations; Levels of Measurement; Pearson’s Product-Moment Correlation; Spearman’s Rank-Order Correlation Coefficient; Simple Linear Regression</td>
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<td>Multivariable Linear Regression</td>
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<td>One-Sample t-Test; Independent-Samples t-Test; Mann-Whitney Test; Median Test</td>
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<tr>
<td>March</td>
<td>One-Way Between-Subjects ANOVA and Post Hoc Tests; Kruskal-Wallis Test; Factorial Between-Subjects ANOVA</td>
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<td>No Class! (Spring Break)</td>
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<td>One-Way Between-Subjects ANCOVA; Paired-Samples t-Test; Wilcoxon Signed-Ranks Test; One-Way Repeated-Measures ANOVA; Friedman’s Two-Way ANOVA by Ranks</td>
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<td>Mixed between-within ANOVA; Chi-square test; McNemar’s Test of Change; Cochran’s Q</td>
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<td>April</td>
<td>Simple Binary Logistic Regression</td>
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<td>Multivariable Binary Logistic Regression</td>
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<td>No Class! (Reserved by College of Nursing)</td>
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<tr>
<td></td>
<td>Kaplan-Meier Analysis; Cox Regression</td>
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<td>No Class! (Reserved by College of Nursing)</td>
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<tr>
<td>May</td>
<td>Open Discussion</td>
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