Division: Theoretical and Behavioral Foundations  
Program Area: Educational Evaluation and Research  
Course #: EER 8860  
Section#: 18268  
Course Title: Nonparametric, Permutation, Exact, & Robust Methods  
Term/Year: Fall, 2016  
Course Location: 349 EDUC  
Day & Time: Wednesday, 4:30 pm  
Instructor: Professor Shlomo Sawilowsky  
Office Address: 371 Education  
Office Hours: Wednesday, 2:00-3:00 pm, 371 EDUC  
Office Phone #: 313.577.5244  
EMAIL: professorshlomo@gmail.com  

Course Description:  
Principles and practices of modern data analysis, with emphasis on computer intensive and non-normal theory methods. Applications to real data situations. Computer usage.  

Course Outcomes: Students will acquire practical skills in modern statistical methods for the social and behavioral sciences, through the use of specialized computer software.  

Texts: Required  
We will discuss the availability of this text in class.  
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(3) Minitab.  
We will discuss the availability of this software in class.  

Optional  
(2) StatXact (stand alone or SPSS module)  

Course Readings  
1. Robust Descriptive methods  
   .1 Measures of Location (Classical)  
   .1 Median  
   .2 Trimmed Mean
3. Winsorized Mean
2. Robust Measures of Dispersion
   1. MAD statistics
3. Macros (trims1.mtb)
4. Confidence Intervals
   1. The Harrell-Davis estimator
   2. SE of the sample median
   3. C.I. for trimmed means
5. M-estimators
6. How much to trim, which \( \psi \) to use?
   1. Sawilowsky
7. Theoretical Distributions
   1. Discrete
   2. Continuous
      1. uniform
      2. binomial
      3. deMoivre
      4. Chi Squared

2. Flowcharts
   1. significance testing vs hypothesis testing vs confidence intervals.

3.0 One sample tests.
   1. Tests of location
      1. Trimmed means.
      2. Testing hypotheses about the population median
      3. sign test.

4.0 Goodness of Fit Tests
   1. Chi-Squared test
   2. Kolmogorov-Smirnov test
   3. Lilliefors’s test for normality

5.0 Two independent samples tests
   1. t test
      3. power
   2. Wilcoxon Rank-Sum test
      1. Ties
   3. Rank Transform
      1. relationship of the two independent samples t test and the rank transform
      2. Summary of rank transform for a variety of layouts (Response to Choi)
   4. Trimmed Means test
   Macro yuen.mtb; yueng.mtb
   Wilcox's folly.
   Zumbo (1997) on Fligner-Policello.
   Mee's CI vs hypothesis test
6.0 Tests for general differences
   Rosenbaum's test
   K-S test
   Savage Test
7.0 Two Related Samples
   Wilcoxon Signed Ranks test.
   Blair and Higgins (1985)
8.0 Correlation
   Spearman's Rho
     large sample sizes (n > 50)
     Kendall's tau.
     Large sample sizes.
9.0 Association
   Chi-squared Test (independence)
10. Oneway K-Independent Samples
    Kruskal-Wallis test
    Median test
    Boneau (1960, 1961); Glass, Peckham, & Sanders (1972), Bradley (1968),
    Blair (1980).
    Wilcox (p. 207), Bradley (1978), Kelly and Sawilowsky (1997).
    Wilcox (W10.5.1, p. 236, Table 10.15).
    Sawilowsky (1990)
12. K-ordered Samples
    Terpstra-Jonkheere test for k > 2 independent samples.
    Mann's Test
    Sawilowsky's I test.
13. Oneway K-dependent Samples
    Friedman test.
      Large sample sizes
      Multiple comparisons
      Neave and Worthington Match test

Assignments
Computer assignments will be made throughout the term. In-class assignments should be a result of team effort. However, all homework assignments must be done individually – no exceptions! A 3 page midterm and a 5 page final project will also be assigned as individual work. The requirements for the essays will be tailored to the group discussion, and clarified at length when the assignments are made.

**Value of Assignments**
1. In class assignments: 20%
2. Homework assignments (September 25, October 9 & 16): 20%
3. 3 page midterm: 20%
4. 5 page final: 40%

**Grading Scale (%)**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
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<td>85 – 89</td>
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<td>B+</td>
<td>83 – 84</td>
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<td>75 – 77</td>
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<td>C+</td>
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<td>C</td>
<td>68 - 72</td>
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<td>F</td>
<td>67 and below</td>
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**IMPORTANT NOTE: TURN YOUR CELL PHONE OFF PRIOR TO CLASS!**

**NOTE: No class on September 25, October 9 & 16.**

**WSU & College of Education Syllabi Notices**

**Academic Dishonesty/ Plagiarism**

The College of Education has a “zero tolerance” approach to plagiarism and other forms of academic dishonesty. (See Student Code of Conduct [http://doso.wayne.edu/assets/student-code-of-conduct-brochure.pdf].) Plagiarism includes copying material (any more than 5 consecutive words) from outside texts or presenting outside information as if it were your own by not crediting authors through citations. It can be deliberate or unintended. Specific examples of academic dishonesty, including what constitutes plagiarism, can be found in the University's Undergraduate Bulletin ([http://bulletins.wayne.edu/ubk-output/index.html](http://bulletins.wayne.edu/ubk-output/index.html)) and Graduate Catalog ([http://www.bulletins.wayne.edu/gbk-output/index.html](http://www.bulletins.wayne.edu/gbk-output/index.html)) under the heading “Student Ethics.” These university policies are also included as a link on Blackboard within each course in which students are enrolled. It is every student’s responsibility to read these documents to be aware which actions are defined as plagiarism and academic dishonesty. Sanctions could include failure in the course involved, probation and expulsion, so students are advised to think carefully and thoroughly, ask for help from instructors if it is needed, and make smart decisions about their academic work.
Enrollment/Withdrawal Policy

Students must add classes no later than the end of the first week of classes. This includes online classes. Students may continue to drop classes (with full tuition cancellation) through the first two weeks of the term. Students who withdraw from a course after the end of the 5th week of class will receive a grade of WP, WF, or WN.

- WP will be awarded if the student is passing the course (based on work due to date) at the time the withdrawal is requested
- WF will be awarded if the student is failing the course (based on work due to date) at the time the withdrawal is requested
- WN will be awarded if no materials have been submitted, and so there is no basis for a grade

Students must submit their withdrawal request on-line through Pipeline. The faculty member must approve the withdrawal request before it becomes final, and students should continue to attend class until they receive notification via email that the withdrawal has been approved.

Beginning the fifth week of class students are no longer allowed to drop but must withdraw from classes. The last day to withdraw will be at the end of the 10th full week of classes. The withdrawal date for courses longer or shorter than the full 15-week terms will be adjusted proportionately.

See the university webpage for full details:
http://reg.wayne.edu/students/information.php

Attention Students with Disabilities:

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-202-4216 (video phone). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.
Religious Observance Policy:
Because of the extraordinary variety of religious affiliations represented in the University student body and staff, the Wayne State University calendar makes no provision for religious holidays. It is University policy, however, to respect the faith and religious obligations of the individual. Students who find that their classes or examinations involve conflicts with their religious observances are expected to notify their instructors well in advance so that alternative arrangements as suitable as possible may be worked out.

Wayne State University Writing Center
The Writing Center (2nd floor, UGL) provides individual tutoring consultations free of charge for students at Wayne State University. While the center serves both graduate and undergraduate students, undergraduate students in General Education courses, including composition courses, receive priority for tutoring appointments. The Writing Center serves as a resource for writers, providing tutoring sessions on the range of activities in the writing process – considering the audience, analyzing the assignment or genre, brainstorming, researching, writing drafts, revising, editing, and preparing documentation. The Writing Center is not an editing or proofreading service; rather, students are guided as they engage collaboratively in the process of academic writing, from developing an idea to correctly citing sources. To make an appointment, consult the Writing Center website: http://www.clas.wayne.edu/writing/.

To submit material for online tutoring, consult the Writing Center HOOT website (Hypertext One-on-One Tutoring) http://www.clas.wayne.edu/unit-inner.asp?WebPageID=1330.