CNEP 6360 RESEARCH DESIGN & STATISTICS

Texas A&M University – Corpus Christi
Department of Counseling and Educational Psychology
COURSE SYLLABUS

Class Meeting Schedule:
Fall 2014 Semester
Tuesdays 7:00 – 9:30pm
ECDC 238

Instructor Information:
Joshua C. Watson, Ph.D., LPC, NCC, ACS
Associate Professor
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Email: joshua.watson@tamucc.edu
Fall 2014 Office Hours: T 4:00-7:00pm; TH 4:00-7:00pm; and by appointment

I. Course Description (3 semester hours)

This course is designed as a doctoral level survey of Research Design and Statistics. The major focus will involve an examination of the theoretical assumptions underlying various research designs and the use of inferential statistics. Special emphasis will be placed on the selection of appropriate design for specific applications in counseling and educational contexts. The course will involve both theoretical exploration and instruction of computer-based statistical tools (SPSS).

II. Rationale

This course has four goals: (a) to increase your understanding of research concepts and procedures, (b) to develop your appreciation of the importance of research in education, (c) to develop your skills in data analysis and interpretation, (d) to develop your skills in preparing a research manuscript.

This course is the first course in a doctoral studies research curriculum. There are several stages in conducting research: planning, piloting, data collecting, data analyzing, and reporting. This class will not cover all of these areas but will provide the blueprint for these areas, which will be elaborated upon in your future course work.

III. State Adopted Proficiencies

Coursework may be applied toward LPC licensure in the State of Texas.
IV. CACREP Standards

1. Understand univariate and multivariate research designs and data analysis methods (IV.E1)

2. Demonstrate the ability to formulate research questions appropriate for professional research and publication in counseling (IV.F1)

3. Demonstrate the ability to create research designs appropriate to quantitative and research questions (IV.F2)

4. Demonstrate professional writing skills necessary for journal and newsletter publication (IV.F3)

5. Understand various quantitative methods for evaluating counseling effectiveness (IV.G2)

6. Understand the procedures for reviewing research literature

7. Understand sampling procedures

8. Understand statistical concepts appropriate for analyzing data from different research designs

9. Understand and apply relevant research ethics

10. Design sound quantitative research and implement appropriate methodologies

11. Demonstrate effect use of statistical software packages (SPSS®)

V. Course Objectives/Learning Outcomes

A. Course Objectives

Students will have knowledge of and be able to demonstrate an understanding of the following research concepts:

- Research ethics
- Models and methods of assessment and use of data
- Univariate and multivariate research designs and data analysis methods
- Formulation of research questions appropriate for professional research and publication in counseling
- Creation of research designs appropriate for professional research and publication in counseling
In addition, each student will develop and be able to demonstrate an understanding of the following statistical concepts:

- How data is collected and how observations are quantified during the scientific and research process
- How observations are represented and stored in a data file
- The structure of a data file
- The scaling and coding of data
- Frequency distributions; how data can be represented visually, and the strengths and weakness of such representation
- Methods of appropriately describing the central tendencies of various distributions
- Variability and how to quantify variability
- The reasoning and assumptions underlying the inferential statistical process
- Correlation, z-tests, t-tests and ANOVA
- The appropriate application and interpretation of various inferential statistical procedures

B. Learning Outcomes

1. Students will design, identify, and evaluate research designs through examination, projects, and homework 3 and 4.

2. Students will formulate research questions specific to counseling research as evidenced by performance on exams and project.

3. Students will differentiate between descriptive, experimental, and correlational designs and will demonstrate appropriate application through examination, homework 3 and 4, and project.

4. Students will conduct a research project consistent with guidelines for publication relevant to the counseling profession in the project component of the class.

5. Students will apply quantitative evaluations specific to counseling effectiveness through completion of a research project and examination.

6. Students will complete a literature review on a counseling-related topic as evidenced by completion of a research project.

7. Students will identify differences in quantitative sampling procedures through examination, homework, and project.

8. Students will utilize statistical concepts appropriate for descriptive, experimental, and correlational designs in examination, project, and homework assignments.
9. Students will complete CITI training on research ethics, design a quantitative research project, and use SPSS in examinations and homework assignments.

VI. Course Topics

- Course Orientation
- Research Overview and Ethics
- Scaling, Reliability, and Validity
- Experimental Designs
- Frequencies, Measures of Central Tendency, Variability, and Standard Scores
- Distributions and Hypothesis Testing
- Correlational Designs
- Non-Parametric Statistics

VII. Instructional Methods and Activities

This course will be presented using a variety of teaching modalities. Course content will be presented in a traditional lecture format followed by class discussion and experiential learning activities. Hands on activities using statistical software packages and calculators will be used to supplement student learning.

Students are required to become familiar with Blackboard as it serves as the primary repository for the information and files relevant to this course. Students can access the Blackboard page for this course at: https://bb9.tamucc.edu/ using their TAMUCC login.

VIII. Evaluation and Grade Assignment

A. Major Course Assignments

Homework Assignments

Throughout the semester you will complete a series of five homework assignments. These assignments are designed to give you the opportunity to demonstrate your understanding of the concepts and techniques being discussed in class. Point values vary for these homework assignments, however the total points for this component is 200. The assignments include:

- Completing IRB training (10 points)
- Conducting a research article review (40 points)
- Constructing frequency distributions and hypothesis testing (50 points)
- Conducting a t-test and interpreting results (50 points)
- Nonparametric testing (50 points)

Research Project
You are required to submit a 12-15 research paper in which you present the results of an original research inquiry. To complete this assignment, you will need to choose a data set (original or existing), analyze the data and report the findings. In your paper you should include a brief literature review on a topic of your choosing, a methods section, analysis, and discussion. A handout further describing the requirements of this assignment will be distributed at the beginning of the semester. Your paper should adhere to APA style standards, including: 12-point Times New Roman font, double-spaced, title page, abstract, and references. Make sure you select a statistical analysis discussed in this class and please refrain from using any data set already used in this class (homework or class examples). Finally, beware of research ethics if you decide to use data from another source or collect data on your own. If you are unsure of how to proceed please ask for clarification or assistance. The research project is worth 100 points.

Examinations

Two (2) examinations (midterm and final) will be assigned this semester. The format of these examinations may include multiple choice, fill-in-the-blank, short answer, and computational problems. The examinations are not cumulative and will only cover new material presented since the last examination. For each examination, you will have 2.5 hours to complete all problems and submit your work. The examinations are each worth 100 points.

B. Point Allocation

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Assignments (5 @ variable pts)</td>
<td>200</td>
</tr>
<tr>
<td>Research Project</td>
<td>100</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>100</td>
</tr>
<tr>
<td>Final Examination</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>500</strong></td>
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</table>

C. Grade Distribution

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
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<tbody>
<tr>
<td>450-500</td>
<td>A</td>
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<tr>
<td>400-449</td>
<td>B</td>
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<tr>
<td>350-399</td>
<td>C</td>
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<tr>
<td>300-349</td>
<td>D</td>
</tr>
<tr>
<td>Below 300</td>
<td>F</td>
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</tbody>
</table>

WRITING ASSIGNMENT TIPS:

To get full credit on written assignments, use American Psychological Association Publication Manual (6th Ed.) guidelines. All written assignments should use 12-point Times New Roman font with 1” margins on the top and bottom of the page as well as the left and right margins. Written assignments are grading according to the rubrics (see Appendices) provided in this course syllabus.
All assignments are due at the beginning of class on the assigned due date. Students are to upload their documents to Blackboard before coming to class. Any assignments not received by the start of class will be considered late. All late assignments receive a letter grade deduction, and no late assignments will be accepted one week after the due date.

I understand that unforeseen circumstances occur from time to time. My advice to you is to be proactive and stay on top of your work. Planning ahead will help you avoid many last minute catastrophes and crises. Should you have a legitimate medical emergency that precludes you from submitting your work on time, let me know as soon as possible as I am willing to work with you and make adjustments.
Partial credit is possible for all computations and written responses (e.g., short essay, open-ended questions). Partial credit will be awarded when minor errors due to computation or a qualified understanding of a concept is noted. No credit is given when several minor errors or major errors/omissions are apparent.

IX. Course Schedule and Policies

A. Tentative Schedule for the Fall 2014 Semester

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic andAssigned Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 26</td>
<td>Class Orientation (introductions, review syllabus) Research Overview and Ethics</td>
</tr>
<tr>
<td>September 2</td>
<td>Scaling, Reliability, and Validity</td>
</tr>
<tr>
<td></td>
<td>Homework #1 Assigned</td>
</tr>
<tr>
<td>September 9</td>
<td>Experimental Design (Part I): Measures, Sampling, and Design Issues</td>
</tr>
<tr>
<td></td>
<td>Homework #2 Assigned</td>
</tr>
<tr>
<td></td>
<td>Homework #1 Due</td>
</tr>
<tr>
<td>September 16</td>
<td>Experimental Design (Part II): Models and Experimental Validity</td>
</tr>
<tr>
<td>September 23</td>
<td>Frequencies and Score Distributions</td>
</tr>
<tr>
<td></td>
<td>Homework #3 Assigned</td>
</tr>
<tr>
<td></td>
<td>Homework #2 Due</td>
</tr>
<tr>
<td>September 30</td>
<td>Measures of Central Tendency, Variability, and Standard Scores</td>
</tr>
<tr>
<td>October 7</td>
<td>MIDTERM EXAMINATION</td>
</tr>
<tr>
<td>October 14</td>
<td>Distributions and Hypothesis Testing</td>
</tr>
<tr>
<td></td>
<td>Homework #4 Assigned</td>
</tr>
<tr>
<td></td>
<td>Homework #3 Due</td>
</tr>
<tr>
<td>October 21</td>
<td>Distributions and Hypothesis Testing</td>
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<tr>
<td></td>
<td>Homework #4 Due</td>
</tr>
<tr>
<td>October 28</td>
<td>Nonparametric Statistics</td>
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<tr>
<td>November 4</td>
<td>Nonparametric Statistics</td>
</tr>
<tr>
<td></td>
<td>Homework #5 Assigned</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
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<tr>
<td>------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>November 11</td>
<td>Correlational Designs</td>
</tr>
<tr>
<td>November 18</td>
<td>Correlational Designs</td>
</tr>
<tr>
<td>November 25</td>
<td>NO CLASS SCHEDULED – THANKSGIVING HOLIDAY</td>
</tr>
<tr>
<td>December 2</td>
<td>FINAL EXAMINATION</td>
</tr>
</tbody>
</table>

**B. Course Policies**

**Absences**

Students are responsible for coming to each class period fully prepared to participate. This includes having read the assigned material for that date as well as completing any projects or assignments that may be due that day. Students are encouraged to ask questions and discuss current issues in order to ensure that they are assimilating the material presented. Any absences should be discussed *in advance* with the instructor.

**Missed Examinations**

Examinations missed due to student absences will receive a grade of *zero* unless prior arrangements have been made with your instructor or a legitimate medical emergency precludes you from completing either the midterm or final at their assigned dates and times. Examinations that are missed for excused reasons will be rescheduled at a time designated by your instructor.

**Late Assignments**

All assignments are to be submitted to Blackboard prior to the beginning of class on the due date specified in the course calendar (see Section IX.A). Assignments not received prior to the beginning of class will be considered late. A letter grade deduction will be applied to all late assignments. Any assignments not turned in by the last day of class will not be accepted and the student will receive a zero for that particular assignment.

**Cell Phone and Technology Usage**
In order to limit classroom disruptions, as well as to protect against academic misconduct, the use by students of cell phones, messaging devices, and other electronic devices is prohibited in the classroom.

Students who text message, talk on their cell phones, answer calls during class, or who appear to be engaged with their cell phones in the classroom will be dismissed from class. No exceptions!

Email Communication

Each TAMUCC student has access to an individual E-mail account through the university e-mail system. All students are expected to activate this e-mail account and to check messages on a regular basis. Announcements and attachments as supplements to the textbook may be sent on occasion to class members through Blackboard. Students will be held responsible for accessing any e-mail or materials posted for this course. E-mail and Blackboard also are very helpful for maintaining communication between students and the course instructor.

Civility

The demonstration of courtesy may be more of a reflection of an individual than feelings toward others. Civility, therefore, is a reflection of one’s professionalism and ethics. When breaches in civility occur (e.g., cell phones, texting, email, talking, etc.), both the learning environment and professional environment may be compromised. I strongly encourage personal and professional boundaries with regards to civility in a graduate class. For many of you, this is the last opportunity to be a student. Enjoy the learning process. While respect may vary toward peers, and even the instructor, respect for the academic environment and the credential pursued should be acknowledged.

Academic Integrity/Plagiarism


University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, forgery, or plagiarism (plagiarism is the presentation of the work of another as one's own work).

Disciplinary action for academic misconduct is the responsibility of the faculty member assigned to the course. The faculty member is charged with assessing the gravity of any case of academic dishonesty, and with giving sanction to any student involved. Penalties that may be applied by the faculty member to individual cases of academic dishonesty include one or more of the following:
1. Written reprimand;
2. Requirement to re-do work in question;
3. Requirement to submit additional work;
4. Lowering of grade on work in question;
5. Assigning grade of "F" to work in question;
6. Assigning grade of "F" for course;
7. Recommendation for more severe punishment, such as dismissal from the program or from the University.

If the faculty member determines that assigning a grade of "F" to the course is the appropriate penalty and this disciplinary action occurs prior to the deadline for dropping courses, the student forfeits his/her right to drop the course in question.

If the faculty member recommends more severe punishment, such as dismissal from the program or from the University, the faculty member will notify the appropriate chair/college dean, who in turn will notify the Office of Student Affairs. If dismissal from the University is recommended, the Office of Student Affairs will follow its procedure for such cases.

The faculty member must file a record for each case of academic dishonesty, including a description of the disciplinary action taken, along with any materials involved, with his or her college dean, who will forward a copy to the Office of Student Affairs. The office of the academic dean of the college in which the offense took place will maintain records of all cases of academic dishonesty reported for a period of five years. The Office of Student Affairs will also maintain records of such cases for a period of five years. The Office of Student Affairs will inform the Graduate Dean as appropriate.

Any student who has been penalized for academic dishonesty has the right to appeal the judgment or the penalty assessed. Students who wish to appeal an academic dishonesty decision should contact the Office of Student Affairs for guidance.

Dropping a Class

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class.

X. Textbooks


**Software**

SPSS® Graduate Pack V.20.0 or higher (Software is also loaded on several computers on campus)

**Optional Texts (recommended but NOT required):**


In addition to the above resources, a number of supplementary articles may be discussed during the course. These will be used to supplement the texts and to exemplify how certain examined statistical methods are used in psychological research. Each of these supplementary readings will be made available by the instructor.

**XI. Bibliography**


Understanding statistics, 3, 201-230.


http://www.psychstat.smsu.edu/introbook/sbk00.htm A very good on-line text for introductory statistics.

http://research.ed.asu.edu/siip/ -- Many resources for statistics, including databases.


http://www.statistics.com/ -- Information about statistics software (major packages like SAS, SPSS and S-PLUS, shareware and smaller packages too), as well as about statistics analysis, data analysis and short courses in statistics.

http://www.dartmouth.edu/~chance/ -- The Chance Database; includes videos and audio on topics related to chance, statistics, probability, randomness, etc. An excellent site.

http://nilesonline.com/data/ -- Where to find data on the Internet; many sources, from agriculture to education to economics and more.

http://www.fedstats.gov/ -- More than 70 agencies in the United States Federal Government produce statistics of interest to the public. The Federal Interagency Council on Statistical Policy maintains this site to provide easy access to the full range of statistics and information produced by these agencies for public use.

Other sources of data may be found at the following:
XII. Grade Appeals

As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

XIII. Disabilities Accommodations

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Driftwood 101.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

XIV. Academic Continuity

In the event of an unforeseen adverse event such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi, this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of
the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

Appendices

Homework 1 (10 points)

Complete the IRB training and print your certificate to submit for a grade (10 points). Save a copy for your records, as you will need to demonstrate completion of this training prior to obtaining IRB approval.

Homework 2 (40 points)

Research Article Review. In a counseling journal, find one experimental and quasi-experimental study and one correlational study (cannot be the same article). Follow the rubric below and address the following content areas:

Rubric

<table>
<thead>
<tr>
<th>Standard</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies relevant literature and formulate research questions appropriate for professional research and publication in counseling (IV.F1)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Creates ethical, research designs appropriate to quantitative research questions through representative sampling and appropriate research design (IV.F2)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Adherence to APA style (IV.F3)</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>

Legend:

0  No evidence of standard
1  Very Poor
2  Poor
3  Fair
<table>
<thead>
<tr>
<th></th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
</tr>
</tbody>
</table>
Homework 3 (50 points)

1. Complete the intro to SPSS tutorial from my website:
   http://web.me.com/rsbalkin/Site/Research_Methods_and_Statistics.html

2. Download the SPSS data from the following website:
   http://www.prenhall.com/greensalkind and open Lesson 21, Data File 1 (be sure it does
   not say Exercise File 1 or Exercise File 2)

3. Create a frequency distribution and bar graph for high school GPA. (4 points)

4. Create a grouped Frequency distribution by hand using interval of .5. (5 points)

5. Using Lesson 21 Exercise File 1, transform the anxiety scores to Z-scores and T-scores
   using SPSS. (5 points)

6. Dimitrov Chapter 6 study questions: 1, 2, 3, 4, 5, and 7 (6 points: 1 point each)

Homework 4 (50 points)

I. Use the following Green and Salkind dataset: Lesson 24, Exercise File 1 and use the scenario
   at the bottom of page 155 in the Green and Salkind text. Conduct the following:

   1. Identify the following: (a) type of design (i.e. pre-experimental, quasi-experimental, true
      experimental), (b) independent and dependent variables, (c) research question. Write this
      in APA style.

   2. This study is a between-subjects post-test only model. What are the limitations/threats to
      experimental validity?

   3. Conduct an independent t-test using SPSS. In the output identify the following:
      a. Result of the normality assumption
      b. Result of the homogeneity of variance assumption
      c. Means and standard deviations for each group
      d. Result of the t-test
      e. p-value

   4. Compute the following (i.e. hand calculations):
      a. t-test using descriptive statistics (i.e. means and standard deviations)
      b. Cohen’s d

   5. Write an APA results section.
II. Use the following Green and Salkind dataset: Lesson 23, Exercise File 2 and use the scenario on page 155 in the Green and Salkind text, complete the following:

1. Conduct a dependent $t$-test using SPSS. In the output identify the following:
   a. Result of the normality assumption
   b. Result of the homogeneity of variance assumption
   c. Means and standard deviations for each group
   d. Result of the $t$-test
   e. $p$-value

2. Compute a Cohen’s $d$

3. Write an APA results section.

4. Using the raw scores, conduct the dependent t-test by hand.

**Sample results section**

A non-directional, independent $t$-test was conducted between males and females based on test scores. An alpha level of .05 was utilized. Groups were normally distributed for males and females ($p > .01$) and variances were homogeneous, $F(1, 8) = .670, p = .437$). No statistically significant difference between males and females on test scores was evident, $t(8) = .498, p = .632$. Effect size was small, $d = .33$, indicative of minimal differences between the groups.

**Homework 5 (50 points)**

   
   *Sample write-up is on p. 335.*


3. *Sample write-up is on p. 342.*

4. Using the data from your output, re-compute the chi-square by hand.
## Final Project Rubric (100 Points)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies relevant literature and formulate research questions appropriate for professional research and publication in counseling (IV.F1)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Creates ethical, research designs appropriate to quantitative research questions (IV.F2)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Adherence to APA style (IV.F3)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Applies univariate research designs and data analysis methods (IV.E1)</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Addresses implications to counseling (IV.G2)</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>