THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
SCHOOL OF SOCIAL WORK

COURSE NUMBER: SOWO 922
COURSE TITLE, SEMESTER AND YEAR: Advanced Topics in Causal Inference: Propensity Score Analysis Fall semester, 2018

INSTRUCTOR: Kirsten Kainz, Ph.D.
School of Social Work
Room 548L Tate Turner Kuralt Building
CB #3550,
Chapel Hill, NC 27599-3550
Phone: (919) 962-8826
Email: kirsten.kainz@unc.edu

CLASS MEETINGS: 9:00-11:50, Fridays TTK 107

OFFICE HOURS: by appointment

COURSE DESCRIPTION: This course focuses on advanced topics in causal inference by reviewing four recent methods developed for observational studies and evaluation of quasi-experimental programs.

COURSE OBJECTIVES: At the completion of the course, students will be able to:
1. Understand challenges posted by evaluation of quasi-experimental or observational data, contexts under which randomized experiments are infeasible, unethical, and expensive, and the importance of taking remedial strategies within such contexts;
2. Understand differences, debates, and similarities between statistical and econometric traditions in developing analytical strategies to overcome challenges posted by quasi-experimental and observational data;
3. Have a solid understanding of the Neyman-Rubin counterfactual framework and two fundamental assumptions: the strongly ignorable treatment assignment, and the stable unit treatment value. Understand Heckman’s critiques to the counterfactual framework and main features of the Heckman’s scientific model of causality;
4. Understand the main features of Heckman’s sample selection and related models, and know how to implement the analysis with Stata;
5. Understand the main features of propensity-score greedy matching and related models, and know how to implement the analysis with Stata;
6. Understand the main features of propensity-score optimal matching and related models, and know how to implement the analysis with Stata and R;
7. Understand the main features of matching estimators, and know how to implement the analysis with Stata;
8. Understand the main features of kernel-based matching and related models, and know how to implement the analysis with Stata;
9. Understand the main features of Rosenbaum’s sensitivity analysis to evaluate potential bias due to hidden selection, and know how to implement the analysis with Stata;
10. Know how to read, evaluate, and criticize evaluation studies.

PRE-REQUIREMENT: Students are assumed to be familiar with descriptive and inferential statistics. They should have statistical and statistical software background at least equivalent to that provided by SOWO 919 Applied Regression Analysis and Generalized Linear Models. Students without such prerequisites should contact the instructor to determine their eligibility to take the course.
STATISTICAL SOFTWARE PACKAGE:
This course will use R. Example code will be provided.

REQUIRED TEXTBOOK/READINGS:

All required readings other than the course textbook will be provided on the course Sakai site. Students are expected to come to class having read the assigned readings for the day.

POLICIES

Grading System
The standard of School of Social Work’s interpretation of grades will be used.

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<tr>
<th>Grade</th>
<th>Percentage</th>
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<tr>
<td>H</td>
<td>94-100</td>
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<td>P</td>
<td>80-93</td>
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<td>L</td>
<td>70-79</td>
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<td>F</td>
<td>69 and below</td>
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<tr>
<th>Assignment</th>
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<tr>
<td>Final Project First Installment</td>
<td>30</td>
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<td>Final Project</td>
<td>50</td>
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<td>Presentation</td>
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<td><strong>TOTAL</strong></td>
<td><strong>100 pts.</strong></td>
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Policy on Attendance
Class attendance will be essential for content and skill learning, and you are expected to attend all scheduled sessions. It’s a student’s responsibility to inform the instructor via email in advance for missing a class session.

Policy on Late and Incomplete Assignments
Assignments are to be turned in to the professor by the due date noted in the course outline. In most cases, *late assignments will not be accepted*. In the case of an emergency extensions may be granted by the professor, but students should contact the professor before the due date to determine if their case is an emergency. Late assignments will be reduced 10 percent for each day late (including weekend days). A grade of incomplete will be given only under extenuating circumstances and in accordance with University policy.

COURSE FORMAT, OUTLINE, AND ASSIGNMENTS
The course format will include a mixture of lecture, discussion/presentation, and practical work with data. The goal of the mixed formatting is to ensure that students build conceptual knowledge about causal inference and confounding in random assignment and observational studies, practical skill addressing data analytic challenges, and expertise for participating in authentic discussions and creating scholarly products related to the course topics. By the end of the course students should be able to:

1) understand, speak about, and write about major ideas from causal inference and counterfactual and potential outcomes frameworks that motivate quasi-experimental methods such as propensity score analysis;
2) critically evaluate research that uses propensity score analysis so as to provide expert peer reviews and research syntheses for journals; 
3) conduct defensible propensity score analyses using recommended practices; and 
4) understand the limitations of propensity score analysis.

Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
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<tbody>
<tr>
<td>Aug 24</td>
<td>The context for causal thinking: evidence-based policy and practice</td>
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<td>Aug 31</td>
<td>Causal inference under random assignment <em>Think, pair, share</em></td>
<td>Deaton &amp; Cartwright, 2017 Bloom, 2006</td>
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<td>Sep 7</td>
<td>Expanding what we understand about random assignment and causal inference</td>
<td>Special Issue Commentary to Deaton &amp; Cartwright, 2017: See references</td>
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<td>Sep 14</td>
<td>Causal inference without random assignment <em>Guest Lecturer, Noah Greifer</em></td>
<td>Foster, 2010 Shadish, 2010</td>
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<td>Sep 21</td>
<td>Introduction to propensity scores pt. 1 <em>Think, pair, share</em></td>
<td>Rubin, 2008 Rosenbaum &amp; Rubin, 1983 (Section 1: Definitions) Ho et al., 2007</td>
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<td>Sep 21</td>
<td><em>Discuss Final Project</em></td>
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<tr>
<td>Sep 28</td>
<td>Introduction to propensity scores pt. 2 <em>Think, pair, share</em></td>
<td>Austin, 2011 Shadish, 2013 Stuart, 2010</td>
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<td>Oct 12</td>
<td><strong>UNIVERSITY DAY</strong></td>
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<td>Oct 19</td>
<td><strong>FALL BREAK</strong></td>
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<td>Oct 26</td>
<td>Studying applications of PSM <em>Populate Study Guide at End of Syllabus</em></td>
<td>Bright et al., 2018 Weon et al., 2017 Gajos &amp; Beaver, 2017</td>
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<td>Nov 2</td>
<td>Propensity score workshop</td>
<td>Leite: Chapters 1 &amp; 2 Shadish &amp; Steiner, 2010</td>
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<td>Nov 9</td>
<td>Propensity score matching workshop</td>
<td>Leite: Chapter 5 Austin, 2008 Stuart, 2008</td>
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<td>Nov 16</td>
<td>Propensity score weighting workshop</td>
<td>Leite: Chapter 3 Austin &amp; Stuart, 2015</td>
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<td>Nov 23</td>
<td><strong>THANKSGIVING HOLIDAY</strong></td>
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<td>Nov 30</td>
<td><em>Final Presentation in Class</em></td>
<td>Final Paper Due by 5:00</td>
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Assignments

There are three assignments for this class: 1) the first installment of a final paper; 2) a final paper; and 3) an oral presentation complemented by visual support (e.g., Power Point slides). In aggregate these assignments will allow students to complete a publishable paper and conference presentation using propensity score methods.

First Installment. Students will submit to the instructor via email the introduction and methods section (~8 pages double spaced) of their final paper using this outline:

1. Describe the phenomenon
   a. What is the significance of the phenomenon?
   b. What does the extant literature say about the phenomenon?
   c. What remains unknown about the phenomenon?
   d. What research questions will this paper use to address what remains unknown?

2. Describe the methods
   a. Sample/dataset
   b. Variables to be used
   c. Analytic method
      i. What is the outcome model and how will it yield answers to the research questions?
      ii. How will propensity score methods be used as a pre-processing technique?
      iii. What standards or best practices will be used in the propensity score methods to ensure they serve as appropriate balancing scores?

Final Paper. Students will submit to the instructor via email their final paper (~15 pages double spaced) that will add a results section and discussion to the first installment. Feedback provided by instructor on first installment is meant to be incorporated into the final paper.

Presentation. Each student will prepare and present a 15 minute summary of their final paper using a visual format (e.g., power point) that is appropriate for conference presentation. The presentation slides do not need to be submitted to the instructor.
**Accessibility and Resources Services:**

The University of North Carolina – Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in difficulties with accessing learning opportunities. All accommodations are coordinated through the Accessibility Resources and Service Office. In the first instance please visit their website [http://accessibility.unc.edu](http://accessibility.unc.edu), Tel:- 919-962-8300 or Email:- accessibility@unc.edu. A student is welcome to initiate the registration process at any time, however, the process can take time. ARS is particularly busy in the run-up to Finals and during Finals. Students submitting Self-ID forms at that time are unlikely to have accommodations set until the following semester. Please contact ARS as early in the semester as possible.

**Writing Support**

Clear, cogent writing is an essential skill for social work professionals. Writing support is available to all students through the School’s Writing Support Team; they can help you strengthen your writing skills by sharing strategies for organizing information, presenting a cohesive argument, ensuring clear communication, and mastering APA style. Writing Support offers a learning opportunity for students but does not merely copy edit student papers. Writing support is available in-person, by e-mail, or by phone. E-mail a requested appointment day and time to SOSWwritingsupport@gmail.com. In addition, see the Writing Resources and References page on the School’s website (under the Current Students tab: [https://ssw.unc.edu/students/writing](https://ssw.unc.edu/students/writing)).

**Honor Code**

The University of North Carolina at Chapel Hill has had a student-administered honor system and judicial system for over 100 years. The system is the responsibility of students and is regulated and governed by them, but faculty share the responsibility. If you have questions about your responsibility under the honor code, please bring them to your instructor or consult with the office of the Dean of Students or the Instrument of Student Judicial Governance. This document, adopted by the Chancellor, the Faculty Council, and the Student Congress, contains all policies and procedures pertaining to the student honor system. Your full participation and observance of the honor code is expected. If you require further information on the definition of plagiarism, authorized vs. unauthorized collaboration, unauthorized materials, consequences of violations, or additional information on the Honor Code at UNC, please visit [http://honor.unc.edu](http://honor.unc.edu).

**Policy on Prohibited Harassment and Discrimination**

The University’s Policy on Prohibited Harassment and Discrimination ([http://www.unc.edu/campus/policies/harassanddiscrim.pdf](http://www.unc.edu/campus/policies/harassanddiscrim.pdf)) prohibits discrimination or harassment on the basis of an individual’s race, color, gender, national original, age, religion, creed, disability, veteran’s status, sexual orientation, gender identity or gender expression. Appendix B of this Policy provides specific information for students who believe that they have been discriminated against or harassed on the basis of one or more of these protected classifications. Students who want additional information regarding the University’s process for investigating allegations of discrimination or harassment should contact the Equal Opportunity /ADA Office for assistance at 919.966.3576 or via email at equalopportunity@unc.edu or through U.S. Mail at

Equal Opportunity/ADA Office  
The University of North Carolina at Chapel Hill  
100 East Franklin Street, Unit 110  
Campus Box 9160  
Campus Box 9160 Chapel Hill, NC 27599

**Access to Food**

Article about food insecurity on UNC Campus: [http://mediahub.unc.edu/hungry-students-unc-chapel-hill-struggles-food-insecurity/](http://mediahub.unc.edu/hungry-students-unc-chapel-hill-struggles-food-insecurity/)

Carolina Cupboard: [http://carolinacupboard.web.unc.edu/](http://carolinacupboard.web.unc.edu/)
References


Bloom, H. S. (2006). The core analytics of randomized experiments for social research. MDRC.


Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects *Biometrika, 70*, 41-55. doi: http://dx.doi.org/10.1093/biomet/70.1.41


**Study Guide for Reviewing Applications of Propensity Score Analysis**

*Use this matrix to create your own “best practice” recommendations (with citations) to guide your critique of published manuscripts.*

<table>
<thead>
<tr>
<th>Best Practice Recommendation</th>
<th>Article Evaluation</th>
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<tbody>
<tr>
<td>Selecting Covariates:</td>
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<td>Estimating Propensity Scores:</td>
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<td>Evaluating Balance:</td>
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<td>Estimating Treatment Effects:</td>
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<td>Reporting of Methods and Outcomes:</td>
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