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, 2017

INSTRUCTOR: Kirsten Kainz, Ph.D.
School of Social Work
Room 563h Tate Turner Kuralt Building
CB #3550,
Chapel Hill, NC 27599-3550
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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.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>H</td>
<td>94-100</td>
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<tr>
<td>P</td>
<td>80-93</td>
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<tr>
<td>L</td>
<td>70-79</td>
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<tr>
<td>F</td>
<td>69 and below</td>
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<table>
<thead>
<tr>
<th>Assignment Type</th>
<th>Points</th>
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<tbody>
<tr>
<td>Best Practice Summary</td>
<td>20</td>
</tr>
<tr>
<td>Advanced Topic Presentation</td>
<td>40</td>
</tr>
<tr>
<td>Primer</td>
<td>40</td>
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<tr>
<td>TOTAL</td>
<td>100 pts.</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 selection bias in 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 25</td>
<td>The context for causal thinking: evidence-based policy and practice</td>
<td></td>
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<tr>
<td>Sep 1</td>
<td>Causal inference under random assignment</td>
<td>Deaton &amp; Cartwright, 2016 Bloom, 2006</td>
</tr>
<tr>
<td>Sep 8</td>
<td>Causal inference without random assignment</td>
<td>Foster, 2010</td>
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<tr>
<td>Sep 15</td>
<td>Introduction to propensity scores pt. 1</td>
<td>Rubin, 2008 Rosenbaum &amp; Rubin, 1983 (Section 1: Definitions) Ho et al., 2007</td>
</tr>
<tr>
<td>Sep 22</td>
<td>Introduction to propensity scores pt. 2</td>
<td>Austin, 2011</td>
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<tr>
<td>Oct 6</td>
<td>Propensity Score Analysis Workshop</td>
<td>Leite: Chapters 1 &amp; 2 Shadish &amp; Steiner, 2010</td>
</tr>
<tr>
<td>Oct 13</td>
<td>Propensity Score Analysis Workshop</td>
<td>Leite: Chapter 3 Austin &amp; Stuart, 2015</td>
</tr>
<tr>
<td>Oct 22</td>
<td>FALL BREAK</td>
<td></td>
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<tr>
<td>Oct 27</td>
<td>Propensity Score Analysis Workshop</td>
<td>Leite: Chapter 4 Hong &amp; Hong, 2009</td>
</tr>
<tr>
<td>Nov 3</td>
<td>Propensity Score Analysis Workshop</td>
<td>Leite: Chapter 5 Austin, 2008 Stuart, 2008</td>
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<tr>
<td>Nov 10</td>
<td>Propensity Score Analysis Workshop</td>
<td>Leite: Chapter 10 Arpino &amp; Mealli, 2011</td>
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<tr>
<td>Nov 17</td>
<td>Guest Speaker, Noah Greifer</td>
<td></td>
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<tr>
<td>Nov 24</td>
<td>THANKSGIVING HOLIDAY</td>
<td></td>
</tr>
<tr>
<td>Dec 1</td>
<td>Student Advanced Topic Presentations</td>
<td></td>
</tr>
<tr>
<td>Dec 4</td>
<td>Final Primer Due by Noon</td>
<td></td>
</tr>
</tbody>
</table>
Assignments

**Best Practice Summaries**

Students will create an annotated bibliography of course readings from September 15, 22, and 29. The annotation will include bulleted points for best practice recommendations contained in each article, including the page number where the recommendation can be found. Copies of the annotated bibliography should be turned into the instructor by the start of class, and students should be prepared to circulate their summaries with classmates for the purpose of co-creating a summary of best practice recommendations.

**Advanced Topic Presentation**

Student groups will present an example of working with one of the advanced propensity score methods described in chapters six through nine in Leite, 2017. The presentation should last 30 minutes and address these prompts:

1. What is the problem we are trying to solve?
2. When/why does this problem arise?
3. How can the advanced topic method address this problem?
4. What are the seminal methodological papers related to the advanced topic?
5. What is the R code, and what does it produce?
6. How do we interpret the output?
7. How satisfied are we with this solution to our problem?

Students will complete a self-assessment to determine their grade for this assignment. The self-assessment follows the reference list in this syllabus.

**Propensity Score Primer**

Each student will create a brief primer on propensity score methods using the section headings enumerated below. The primer should be 10 pages maximum (double spaced) and suitable to serve as: a guide to share with research colleagues/clients; part of the analysis section of a dissertation; or the introduction to a methodological paper using propensity score methods.

1. Causal inference & observational studies
2. Background on propensity score methods
3. Common propensity score techniques
4. Recommendations for best practice
5. Summary
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, 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).

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.

Policy on Prohibited Harassment and Discrimination

The University’s Policy on Prohibited Harassment and Discrimination (http://www.unc.edu/campus/policies/harassanddiscrim.pdf) prohibits discrimination or harassment on the basis of an individual’s race, color, gender, national origin, 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
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


Advanced Topic Presentation  
*Self-Assessment*

Name:

Please rate yourself on the following items to form your grade for the Advanced Topic Presentation. Total possible points for the assignment is 40, and the sum of your responses is your final grade.

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Not at all True</th>
<th>Not True</th>
<th>Somewhat True</th>
<th>True</th>
<th>Very True</th>
</tr>
</thead>
<tbody>
<tr>
<td>I participated actively in my presentation group: communicating by email, attending meetings, sharing resources, and developing presentation components.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I searched the published literature for examples of this advanced topic.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I talked with other students and faculty about this advanced topic to get a sense of how it was perceived by others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I read the Leite materials carefully to prepare for this presentation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I contributed scholarly content to the final presentation, at least as much as my group mates did.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I understand the basic ideas underlying the advanced topic we presented.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I could teach a mini-lecture to peers on the advanced topic we presented.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I could independently conduct analysis related to this advanced topic.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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