BSTA660: Design of Observational Studies

Fall 2019
Tuesdays and Thursdays 1:30 – 2:50
BRB 253

Course Director

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Course Description

The objective of this course is to prepare students to design and analyze medical research studies using observational data. Through a combination of lectures and hands-on assignments, students will learn to identify an appropriate study design to answer a given research question, identify possible sources of bias, conduct an analysis appropriate to a given study design and interpret results, and conduct sensitivity analyses to evaluate robustness of results to common sources of bias and error.

Topics for the course will include:
- observational study designs
- common sources of bias
- confounder control via matching and propensity scores
- sensitivity analysis

Course Requirements and Grading

- Three homework assignments (25% each)
- Class participation (25%)

Course Materials

Required Text: Rothman KJ, Greenland S, Lash T. *Modern Epidemiology,* 3rd Edition. Philadelphia: Lippincott Williams & Wilkins; 2008.
Optional Text: Weiss N, Koepsell T. *Epidemiologic Methods,* 2nd Edition. New York: Oxford UP; 2014.

Material from the textbook will be supplemented with readings from the statistical and epidemiologic literature.

In case of conflict, lecture material takes precedence over readings.

Class Canvas Site

This course will use Canvas to share materials including lecture notes and readings, to submit homework assignments, and to interact outside of the classroom via the discussion board. Lecture notes and readings from sources other than the textbook will be made available prior to class each week. Students should check Canvas regularly for information.

Expectations

Students are expected to:

- Complete all assigned readings prior to class.
- Participate in class discussions and activities.
- Complete all homework assignments by the due date. No credit will be given for late assignments except in extraordinary circumstances.
- Comply with the University of Pennsylvania's Code of Academic Integrity policy on plagiarism. Students may work together on homework assignments, but the final submitted document should be prepared by each individual student. No credit will be given for work that is plagiarized, either from another student, the internet, or any other source.

Course Schedule (Tentative)

Class session	Date	Topic	Reading
1	9/3/19	Elements of study design	Chae 2019, Cronin 2009 (optional)
2	9/5/19	Alignment of study design and interpretation of results	
3	9/10/19	Ecologic and Cross-sectional studies	RGL Chapter 25, Greenland 1992, Harding 2015, Hubbard 2016 (optional)
4	9/12/19	Cohort studies	RGL Chapter 7, Laurson 2008
5	9/17/19	Homework 1 discussion	
6	9/19/19	Case-control studies	RGL Chapter 8, Abrahamsen 2010, Dell 2012
	9/24/19	BIG DATA CONFERENCE – NO CLASS	
7	9/26/19	Homework 2 discussion	
8	10/1/19	Methods for analysis of cohort and case-control studies	Thiebaut 2004, Weinberg 1990, Abrahamsen 2016 (optional)
9	10/3/19	Matched study designs, inverse probability weighting and selection bias	RGL Chapter 11, Rosenbaum 1984, Kwok 2015, Hernan 2004, Seaman 2011 (optional)
10	10/8/19	Measurement error and misclassification	RGL pgs. 137-146, Magder 1997, Thomas 1993 (optional)
	10/10/19	FALL TERM BREAK	
11	10/15/19	P-hacking and reproducibility	Ioannidis 2005, Jager 2014
12	10/17/19	Sensitivity analysis	RGL Chapter 19, Rosenbaum 1983, Lash 2014 (optional)

RGL = Textbook by Rothman, Greenland & Lash