

**BSTA 661: DESIGN OF INTERVENTIONAL STUDIES**  
**INSTRUCTOR: ALISA J. STEPHENS-SHIELDS, PHD, FALL SEMESTER 2022**  
**MONDAYS AND WEDNESDAYS, 12:00-1:30 PM, BLOCKLEY 418**

**SYLLABUS:**

Description: This course is designed for graduate students in statistics or biostatistics interested in the issues underlying the design of interventional studies. General topics include designs for various types of clinical trials (Phase I, II, III), endpoints and control groups, statistical inference in interventional studies, sample size determination, and design considerations for adaptive designs and interventions. Regulatory and ethical issues will also be covered. Students should have a working knowledge of basic biostatistical principles and familiarity with a statistical programming language (e.g. R, SAS). (0.5 course unit, second half of fall semester)

Prerequisites: Permission of instructor

Recommended Text: *\*Piantadosi S. Clinical Trials: A Methodologic Perspective. Second edition. Wiley, 2005.* Additional readings will be taken from the classic and current literature, including textbooks and journal articles

Supplementary Texts: See next page (optional, students may find helpful for additional reading)

Grading: There will be three homework assignments and a final project. Grading will be based on the homework (75%), and class participation (25%).

Teaching Assistant: Melanie Loth

Labs: There will be 3 optional labs after each homework is assigned. The location, time, and format (virtual or in person) is to be determined.

Date	Lecture	Topic	Reading	Assignments
August 31	Lecture 1	Introduction to Interventional Studies	6.1-6.3,3.1-3.4	
September 7	Lecture 2	Phase I Clinical Trials	10.2,10.3.1-2 10.4.1-5	HW 1 Assigned
September 12	Lecture 3	Phase II Clinical Trials		
September 14	Lecture 4	Control Groups and Mechanics of Treatment Assignment	13	
September 19	Lecture 5	Endpoints in Interventional Studies	8.3-8.7	HW 1 Due/HW2 Assigned
September 21	Lecture 6	Hypothesis Testing and Effect Estimation	16.2-16.4	
September 26	Lecture 7	Estimands in Clinical Trials		
September 28	Lecture 8	Sample Size and Power for Measured Outcomes	11.1-11.5	HW 2 Due / HW3 Assigned
October 3	Lecture 9	Experimental Designs	19.1-19.5, 20.1-20.2	
October 5	Lecture 10	Monitoring and Group Sequential Designs	14.1-14.4	
October 10	Lecture 11	Pragmatic Trials		HW 3 Due
October 12	Lecture 12	Adaptive Designs		
October 17	Lecture 13	SMARTs for Adaptive Interventions	Almirall et al. (2011)	

## Texts Recommended for Further Reading on Clinical Trials

### Highly-recommended:

- Cook TD, DeMets DL. Introduction to Statistical Methods for Clinical Trials. First edition. Chapman and Hall/CRC, 2007.
- Friedman LM, Furberg CD, DeMets DL. Fundamentals of Clinical Trials, Fourth edition, Springer, 2010.
- Senn S. Statistical Issues in Drug Development. Second edition. Wiley, 2007.

### Other Texts on Clinical Trials in General:

- Chow S-C. Controversial Statistical Issues in Clinical Trials. First edition. Chapman and Hall/CRC, 2011.
- Chow S-C, Liu J-P. Design and Analysis of Clinical Trials: Concepts and Methodologies. Second Edition. Wiley, 2004.
- Evans S, Ting N. Fundamental Concepts for Clinical Trial Statisticians. First edition. Chapman and Hall/CRC, 2011.
- Meinert CL. An Insider's Guide to Clinical Trials. First edition. Oxford University Press, 2011.
- Meinert CL. Clinical Trials: Design, Conduct and Analysis. Second edition. Oxford University Press, 2012.
- Peace KE, Chen D-G. Clinical Trial Methodology. First edition. Chapman and Hall/CRC; 2010.
- Pocock SJ. Clinical Trials: A Practical Approach. First edition. Wiley, 1984.
- Redmond CK, Colton T. Biostatistics in Clinical Trials. First edition. Wiley, 2001.
- Spilker WA. Guide to Clinical Trials. First edition. Raven Press, 1991.

### Specialized Trial Designs:

- Cayen MN. Early Drug Development: Strategies and Routes to First-in-Human Trials. First edition. Wiley, 2010.
- Crowley J, Green S, Benedetti J, Smith A. Clinical Trials in Oncology. Second Edition. Chapman and Hall/CRC, 2002.
- Hayes RJ, Moulton LH. Cluster Randomised Trials. First edition. Chapman and Hall/CRC, 2009.
- Julious S, Tan S-B, Machin D. An Introduction to Statistics in Early Phase Trials. First edition. Wiley, 2010.
- Rosenberger WF, Lachin JM. Randomization in Clinical Trials: Theory and Practice. First edition. Wiley-Interscience, 2002.
- Senn SS. Cross-over Trials in Clinical Research. Second edition. Wiley, 2002.

### Sequential/Adaptive Methods and Monitoring:

- Berry SM, Carlin BP, Lee JJ, Muller P. Bayesian Adaptive Methods for Clinical Trials. First edition. Chapman & Hall/CRC, 2010.
- Ellenberg SS, Fleming TR, DeMets DL. Data Monitoring Committees in Clinical Trials: A Practical Perspective. First edition. Wiley, 2002.
- Herson J. Data and Safety Monitoring Committees in Clinical Trials. First edition. Chapman and Hall/CRC, 2009.
- Jennison C, Turnbull BW. Group Sequential Tests with Applications to Clinical Trials. First edition. Chapman and Hall/CRC, 2000.
- Proschan MA, Lan KKG, Wittes JT. Statistical Monitoring of Clinical Trials: A Unified Approach. First edition. Springer, 2010.
- Whitehead J. The Design and Analysis of Sequential Clinical Trials. Second edition. Wiley, 1996.

### Related Topics:

- Chen D, Peace KE. Clinical Trial Data Analysis Using R. First edition. Chapman & Hall/CRC, 2010.
- Dmitrienko A, Molenberghs G, Offen W, Chuang-Stein C. Analysis of Clinical Trials Using SAS: A Practical Guide. First edition. SAS Publishing, 2005.
- McFadden E. Management of Data in Clinical Trials. Second edition. Wiley-Interscience, 2007.