

## EPID 642: Sampling and Power

Tuesday/10AM – 12PM/Room 1655

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Office Hours: Friday 10:30am – 12:30pm, SPH 1-2665

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**Course Description:** This course introduces 1) various sampling methods (simple random sampling, stratified sampling, cluster sampling, convenience sampling, control sampling strategies in case-control design) and 2) power and sample size calculations. This course consists of lectures and hands-on exercises in computer labs, homework assignments, and a final project.

**Course Materials:** Hulley, SB., Cummings, SR., Browner WS., Grady DG., Newman TB., Designing Clinical Research: 3rd Edition. Lippincott, Williams and Wilkens, 2007.

Digital Library online version is also available at

<http://www.r2library.com/Resource/Title/0781782104>.

The instructor will also provide comprehensive lecture notes via Canvas. Papers identified for required and recommended reading will be available in Canvas. A tentative list is provided at the end of this syllabus.

**Pre-requisites:** EPID 600 (or equivalent), EPID 640, and BIostat 501 or 521 (or equivalent)

**Course Goals:** The goal of this course is to learn about how to design surveys with appropriate sampling methods widely used in epidemiologic research and how to compute sample sizes and/or powers given different epidemiologic study designs and statistical models.

**Competencies:** After completing this class, students are expected to be able to attain the following Epidemiology Department MPH competencies:

- Be familiar with basic aspects of field methods in epidemiology (e.g. human subject protection, data collection and management, survey design, sampling strategies, calculating power, and public health surveillance).

Specifically, students will be able to

- Choose and design appropriate sampling methods for different epidemiologic study designs.

- Compute sample size and/or power for different epidemiologic study designs and statistical models.

**Course Requirements:** Final course grades will be based on attendance and class participation/activity (30%), one homework assignment (35%) and one quiz (35%).

**Classroom Expectations/Etiquette:**

Class attendance will be required. No smart phones will be normally allowed in class without the instructors' permission. University policy specifies that students are responsible for all official correspondences sent to their standard University e-mail address. Students should check this account frequently. Group work and didactic discussions are a key element of this class. Students will be expected to engage and participate fully.

**Academic Integrity:**

The faculty and staff of the School of Public Health believe that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, community partners, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School.

Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts.

Please visit <http://www.sph.umich.edu/academics/policies/conduct.html> for the full SPH Code of Academic Integrity and further definition of these terms.

**Student Well-being:**

SPH faculty and staff believe it is important to support the physical and emotional well-being of our students. If you have a physical or mental health issue that is affecting your performance or participation in any course, and/or if you need help connecting with University services, please contact the instructor or the Office of Academic Affairs.

Please visit <http://www.sph.umich.edu/students/current/#wellness> for more information.

**Student Accommodations:**

Students should speak with their instructors before or during the first week of classes regarding any special needs. Students can also visit the Office of Academic Affairs for assistance in coordinating communications around accommodations.

Students seeking academic accommodations should register with Services for Students with Disabilities (SSD). SSD arranges reasonable and appropriate academic accommodations for students with disabilities. Please visit <http://ssd.umich.edu/accommodations> for more information on student accommodations.

Students who expect to miss classes, examinations, or other assignments as a consequence of their religious observance shall be provided with a reasonable alternative opportunity to complete such academic responsibilities. It is the obligation of students to provide faculty with reasonable notice of the dates of religious holidays on which they will be absent. Please visit [http://www.provost.umich.edu/calendar/religious\\_holidays.html#conflicts](http://www.provost.umich.edu/calendar/religious_holidays.html#conflicts) for the complete University policy.

## Course Topics:

Session	Lecture	Lab
1	In-class lecture: Course overview, Introduction to Epidemiologic Research Design	Use of virtual sites Reference management programs
2	On-line lecture: Non-probability sampling Probability sampling 1 (simple random, systematic sampling)	Simple random and systematic sampling using proc surveyselect
3	On-line lecture: Probability sampling 2 (stratified sampling, cluster sampling)  Homework 1 will be handed out.	Stratified sampling and cluster sampling using proc surveyselect
4	On-line lecture: Sampling fractions by study design; Control sampling strategies in case-control studies	Sampling and study bias; matching; density sampling
5	On-line lecture: Sample size and power 1 (basics, t-test, chi-squared test)  <b>Homework 1 due</b>	Sample size and power calculation using a web-based program (e.g., openepi.com) and proc power
6	In-class lecture: Sample size and power 2 (advanced, survival analysis, when confounding exists, sample size/power for gene-environment interaction)	Sample size and power calculation using proc power
7	Final quiz Quiz review Sampling and power calculation in grant proposals Wrap-up	

## Reading List:

### Session 1

Hulley, Newman, Cummings. Chapter 1. Getting Started: The Anatomy and Physiology of Clinical Research. In: Hulley, Cummings, Browner, Grady, Newman (Eds.), Designing Clinical Research. 3<sup>rd</sup> Ed. Lippincott Williams & Wilkins. 2007\*\*

### Session 2 and 3

Aday and Cornelius. Chapter 6. Deciding who will be in the sample. In: Designing and conducting health surveys. A comprehensive guide. 3<sup>rd</sup> Ed. Jossey-Bass. 2006.

Cassell and Pathways. Complex Sampling Designs Meet the Flaming Turkey of Glory. SUGI 28. Paper 262-28. Available at <http://www2.sas.com/proceedings/sugi28/262-28.pdf>.

#### Session 4

Wacholder, Silverman, McLaughlin, Mandel. Selection of controls in case-control studies. I. Principles. Am J Epidemiol 1992;135:1019-28.

Wacholder, Silverman, McLaughlin, Mandel. Selection of controls in case-control studies. III. Design Options. Am J Epidemiol 1992;135:1042-50.

#### Session 5 and 6

Browner, Newman, and Hulley. Chapter 5. Getting Ready to Estimate Sample Size: Hypotheses and Underlying Principles. In: Hulley, Cummings, Browner, Grady, Newman (Eds.), Designing Clinical Research. 3<sup>rd</sup> Ed. Lippincott Williams & Wilkins. 2007\*\*

Browner, Newman, and Hulley. Chapter 6. Estimating Sample Size and Power: Applications and Examples. In: Hulley, Cummings, Browner, Grady, Newman (Eds.), Designing Clinical Research. 3<sup>rd</sup> Ed. Lippincott Williams & Wilkins. 2007\*\*

Newman. 14. Sample size and power. In: Biostatistical methods in epidemiology. Wiley. 2003.

Efird and Hong. Computing Power and Sample Size using the SAS System. Available at <http://www.wuss.org/proceedings08/08WUSS%20Proceedings/papers/tut/tut06.pdf>.

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\*\*Please note that an online version of the full textbook “Designing Clinical Research” by Hulley et al. is available at the UM library.