# We’ve got the power! Power and sample size calculations for ophthalmology and vision research

# Course organizers

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**Gui-shuang Ying, PhD,** Perelman School of Medicine, University of Pennsylvania

# Presentations

Presenters and presentations may change.

| **Time** | **Topic** | **Speaker name, degrees and affiliations** |
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| 8- 8:10am | Welcome, Course Aims, introductions and brief description of course motivation | Alison Abraham, PhD, MS, MHS and Gui-shuang Ying, PhD |
| 8:10-8:40am | Session 1: Basic concepts for sample size and power calculations | Maureen Maguire, PhD, University of Pennsylvania  <https://www.med.upenn.edu/apps/faculty/index.php/g275/p10626> |
| Basic concepts in the determination of sample size and power analysis for 1) estimation of a mean or proportion from one sample and 2) comparison of means or proportions from two samples will be introduced. The hypothesis testing framework will be introduced and consideration will be given to specifying the null hypothesis, the alternative hypothesis, Type 1 (alpha) error and Type 2 (beta error). The concepts of power and minimum detectable effect (MDE) size within this framework will be presented. These key concepts will be expanded upon in the presentations that follow. | | |
| 8:40-9:10am | Session 2: So you have a study question... How to translate a study | Alison Abraham, PhD, MS, MHS, Colorado School of Public Health and Sue Anschutz Rodgers Eye Center <https://coloradosph.cuanschutz.edu/resources/directory/directory-profile/Abraham-Alison-UCD6003602142> |
| In this session of the workshop, we will see how a specific study question or grant aim and the fixed design features of a proposed study, translate into an estimate of power or sample size. We will discuss how to arrive at estimates of the minimal detectable effect size and variability in order to estimate power and strategies for assessing a range of differences, variances, and powers when there is uncertainty as to what effect size might be expected. | | |
| 9:10-9:50am | Session 3: Continuous study outcomes. One sample, two sample and correlated data problems | Bernard Rosner, PhD, Harvard Medical School and School of Public Health  <https://www.hsph.harvard.edu/bernard-rosner/> |
| We will discuss power and sample size calculations for continuous outcomes. Both paired-sample and independent-sample designs will be considered, including both person-level and eye-level endpoints. A special feature of power and sample size estimation for eye-level endpoints which we will cover is how to account for correlated eye data. Also, relative efficiency of eye-level vs. person-level endpoints will also be discussed. | | |
| 9:50-10:10am | Break ( 20 minutes) |  |
| 10:10-10:50am | Session 4: Categorical study outcomes. One sample, two sample and correlated data problems | Gui-shuang Ying, PhD  School of Medicine  University of Pennsylvania  http://www.ncbi.nlm.nih.gov/pubmed/?ter  m=Ying+GS |
| This session will cover the sample size calculation based on the precision of proportion (with 95% confidence interval), the comparison of two proportions, the odds ratio or risk ratio for association between two categorical variables, under both independent setting and dependent setting (due to matching or correlation from two eyes of a subject). Real life examples will be used to demonstrate sample size/power calculation and how one may leverage two eyes per subject to optimize either sample size or power. | | |
| 10:50-11:20am | Session 5: Power and Sample Size Calculation for non-inferiority trial | Xiangrong Kong, PhD, Wilmer Eye Institute, Johns Hopkins University |
| This lecture will cover power and sample size calculation for non-inferiorty trial. By working through a real-world example of the design of an AMD trial, we will introduce the concept, the statistical hypotheses, and key parameters related to non-inferiorty trial. We will illustrate the process of translating clinical knowledge and interest into specification of key parameters needed for the PSS calculation. The calculation will be demonstrated using sample size software such as PASS and Stata. | | |
| 11:20am-12pm | Session 6: Interactive power and sample size calculations with Q&A | Jiangxia Wang, MS, MA  Department of Biostatistics  Johns Hopkins University  <https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-biostatistics-center/about-us/our-people/> |
| This is the interactive session of the course. The objective of this session is to help the attendees better understand how to formulate statistical hypothese and the parameters in a sample size calculation. To explore the abstract concepts, we will employ the format of case studies to review specific examples of reasoning and calculation for deciding on sample sizes involving different study designs and different data types. | | |
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