Instructor: H. N. Nagaraja, 240 Cunz Hall; e-mail: hnagaraja@cph.osu.edu


Additional Resources
(2) Software SAS JMP Version 9/10 (OSU has annual site license; free)

Course Description: Probabilistic concepts; regulatory systems; ethical considerations; Phase I-IV trials; trial designs; statistical design principles; sample size determination; analysis of randomized control trials.

Prerequisites: PUBHBIO 6212, or STAT 5302 or permission of instructor. Not open to students with credit for BIOSTAT 615 (quarter).

Course Objectives: The main objective of the course is to teach essential features of the design and statistical analysis of human clinical trials. Upon successful completion of this course, students will be able to:
1. Identify sources of random and systematic error (bias) in randomized clinical trials.
2. Specify the null and alternative hypotheses for randomized clinical trials.
3. Identify the regulatory and ethical issues applicable to randomized clinical trials.
4. Describe statistical designs that useful in common clinical trials.
5. Use appropriate methods of randomization in the design of randomized clinical trials.
6. Use and apply sample size calculations for sufficient statistical power in common randomized clinical trial designs.
7. Implement procedures for determination and evaluation of adverse events in randomized clinical trials.
8. Analyze data collected from commonly used clinical trial designs.

CPH Core Competencies:

This course will satisfy the following general MPH core competencies in Biostatistics:
1. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
2. Apply descriptive and graphical techniques commonly used to summarize public health data.
3. Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
4. Apply common statistical methods for inference and describe the assumptions required for each method.
5. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
This course will satisfy the following additional core competencies for an MPH with specialization in Biostatistics:

1. Conduct statistical procedures and data analysis methods appropriate for analyzing data obtained from health-related research studies.
2. Make statistical inferences and prepare reports to communicate them, with limited supervision.
3. Apply appropriate statistical techniques for analyzing public health-related data with specific characteristics, including:
   a. Continuous data
   b. Categorical data
   c. Time-to event data
   d. Repeated measurements data
   e. Clustered data
4. Use at least one major statistical data analysis package (STATA, SPSS, SAS, R, or Splus).

This course will satisfy the following additional Biostatistics core competencies for MS students:

1. Evaluate research data and prepare a report summarizing the data, interpreting the statistical results, and presenting the findings, limitations and conclusions.
2. Present and explain the study’s purpose, methods, results, and conclusions to an informed audience.

This course will satisfy the following additional Biostatistics core competencies for PhD students:

1. Formulate hypotheses and design a research study using the appropriate research methods and approaches.

Grading Scheme: Homework (Expect 6 home works) 30%; In-class Midterm 30%; Final Paper 40%

Final Paper
Stage 1: Topic/Paper Selection by Friday, Week 6 (5%).
Stage 2: (Tentative) Abstract by Friday, Week 12 (5%).
Stage 3: Final Report due at a time set by the Final exam schedule (30%)

Anticipated Grade Assignment Distribution

A  100-94 Outstanding work that reflects mastery of the material and the ability to apply it critically and creatively
A- 93-90 Excellent work that reflects mastery of the material
B+  89-87 Good work that reflects mastery of most of the material
B   86-83 Good work that reflects mastery of some of the material
B-  82-80 Good work that reflects mastery of a few aspects of the material
C+  79-77 Mediocre work that reflects familiarity with, but not mastery of the material
C   76-73 Mediocre work that reflects familiarity with most of the material
C-  72-70 Mediocre work that reflects some familiarity with the material
D:  60-69 Mediocre work that reflects little familiarity with the material
E:  Under 60
Topics and Coverage Schedule (Tentative)

| Week 1 (1/7/2013): | Clinical Trials - Types and Phases; Study Designs in Medical Research (Phase III). (Read Chapters 1, 2, 4, and 6). |
| Week 2 (1/14/2013): | Probabilistic Concepts in Clinical Trials; Statistical Perspectives; SAS JMP (Ch. 5 and 7) |
| Week 3 (1/28/2013): | Regulatory systems and guidelines; Ethical considerations; Elements of a Clinical Trial Protocol (Appendices D, E, F; Ch. 3, 22) |
| Week 4 (2/4/2013): | Defining the Question; Clinical endpoints (primary, secondary, surrogate); The study cohort (Ch. 8 and 12) |
| Week 5 (2/11/2013): | Study Designs for Phase I and II Trials (Ch. 10) |
| Week 6 (2/18/2013): | Sample Size and Power (Ch. 11) |
| Week 7 (2/25/2013): | Treatment Allocation; Treatment Effects Monitoring (Ch. 13, 14) |
| Week 8 (3/4/2013): | Mid Term (in class) |
| Week 9 (3/18/2013): | Survival Analysis- Models and Methods (Ch. 16); Cross-over Trials (Ch. 20) |
| Week 10 (3/25/2013): | Meta Analysis (Ch. 21) |
| Week 11 (4/1/2013): | Analysis of Covariance; Regression (Ch. 17). |
| Week 12 (4/8/2013): | Multiple Testing and Interim Analyses [Extra: Read Ch. 9 and 18] |
| Week 13 (4/15/2013): | Longitudinal and missing data Issues (Ch. 15). |
| Week 14 (4/22/2013): | Review; and Discussion of Final Project Reports |

Guidelines for the Final Paper

1. Title: A Report on “Title of the Paper or Topic” By “First_Name Last_Name”
2. Abstract
3. Introduction
   - Brief review of the literature; introduction of the scientific question
4. Statistical Perspective on the Methods Used: Choice of Primary and Secondary Variable; is the surrogate (if used) a good surrogate? Statistical Models Used in the Design of the
Experiment; Sample size Choice; Randomization issues; Missing Data Handling; Interim Analyses (if any).

5. Discussion: (a) Statistical models and methods used; good and bad aspects; how would you have done it? (b) Have the authors interpreted the statistical “p-values” and “confidence intervals” appropriately? (c) Could they have extracted more useful information from the data collected? If you have an example in the tables or figures presented, give it.

6. Key 5 References Max (Starting with the primary source, and then alphabetically using the style of the reference list in the text.)

7. A copy of the primary source stapled to the back of your paper.

8. Total length of the report: At least 5, but not exceeding 10; Font: Times New Roman; Size:12; Line spacing: 1.5.

Note: You can choose a single paper or a collection of papers on a specific topic.

Office of Disability Services: Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your special needs. Please contact the Office for Disability Services at 614-292-3307 in room 150 Pomerene Hall to coordinate reasonable accommodations for students with documented disabilities.

Academic Integrity: Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's Code of Student Conduct and the College's Student Handbook, and that all students will complete all academic and scholarly assignments with fairness and honesty. The Code of Student Conduct and other information on academic integrity and academic misconduct can be found at the COAM web pages (http://oaa.osu.edu/coam.html). Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct, the Student Handbook, and in the syllabi for their courses may constitute “Academic Misconduct.”

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: “Any activity that tends to compromise the academic integrity of the University, or subvert the educational process.” Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the Student Handbook. Ignorance of the Code of Student Conduct and the Student Handbook is never considered an “excuse” for academic misconduct.

If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.