The Ohio State University College of Public Health
PUBHBIO 7245 – Biostatistical Collaboration
2 credit hours – Spring 2017

Instructor:	Kellie J. Archer, Ph.D.
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Class Time and Location:	Mondays 8:00AM – 9:55AM
Instructor's Office Hours:	Wednesdays 11:30AM - 12:30PM
TA Name, email, and office hours:	Not applicable
TA responsibilities:	Not applicable

Course description: This course prepares students to collaborate with biomedical researchers to design studies and experiments, plan sample size, plan the statistical analysis, and engage in statistical consulting. Topics include protocol preparation, presenting results, statistical report generation, and writing analytical code for ensuring scientific rigor and reproducibility of results.

Class Format: A typical class meeting will be comprised of one or a combination of:

1. Consulting session. For many projects, the client may come to class only one time, and part of that class period is devoted to suggesting and/or finding solutions to the client's problems. If a project is identified as a major project, a number of sessions will be used for discussion with the client.
2. Discussion of relevant literature on consulting and other related topics.
3. Discussion on the project(s) in progress.
4. Short lectures or discussions on unfamiliar statistical methodology.
5. Techniques for ensuring scientific rigor and reproducibility of results.
6. Presentations of solution to client's problems.
7. Sample size calculations.

Course Objectives: The main objective of this course is to teach essential skills needed for success as a statistical collaborator in collaborative research in public health and medicine. Upon successful completion of this course, students will be able to:

1. Apply statistical consulting skills such as communication and collaborative problem solving.
2. Explain how the basic principles of science can be integrated with those of statistics.
3. Propose design and analysis methods appropriate for answering research questions of health science researchers, and explain these methods to these collaborators. This will involve formulating hypotheses, choosing appropriate outcome variables, identifying potential confounding variables or other biases, and determining efficient designs and sufficient sample size.

4. Describe the use and implementation of statistical methods not covered in the standard coursework.
5. Write the statistical analysis sections for proposals, papers, and other reports.

Core Competencies: This course will satisfy the following general MPH core competencies in Biostatistics:

- Apply appropriate descriptive and inferential statistical techniques to public health data and interpret results of statistical analyses in the context of public health research and evaluation. (1)
- Apply epidemiologic principles to investigate the distribution of risk factors and disease in the population to improve public health. (3)
- Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities. (6)

This course will satisfy the following additional core competencies for an MPH with specialization in Biostatistics:

- Critique scientific research articles and assess the appropriateness of statistical applications involved. (1)
- Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met. (2)
- Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences. (3)
- Apply appropriate statistical techniques for analyzing public health-related data with specific characteristics. (4)
- Collaborate with investigators in the design and analysis of data for public health related research. (5)
- Describe basic concepts of probability, random variation and commonly used statistical probability distributions. (6)
- Use standard statistical software for both data management and data analysis. (7)

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

- Read the scientific literature in the student's field and critique the methods and results. (8)
- Conduct literature reviews to evaluate the state of the science regarding specific topics. (9)
- Conduct a research study. (12)
- Evaluate research data and prepare a report summarizing the data, interpreting the statistical results, and presenting the findings, limitations and conclusions. (13)
- Present and explain the study's purpose, methods, results and conclusions to an informed audience. (14)

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

- Critique general scientific research articles and assess the appropriateness of the statistical applications and methodology involved. (2)

- Work effectively and collaboratively in a team on a biological or health-related scientific question. (3)
- Design biological or health-related research studies and construct and implement statistical analysis plans appropriate for such studies. (4)
- Communicate the results of statistical analyses to statistical and non-statistical audiences. (5)
- Conduct thorough literature reviews to summarize, evaluate and critique the state of the science regarding new topics in the student's general area of specialization. (6).
- Carry out a research project that makes a contribution to biostatistical methodology and/or practice. (8)

A complete list of College of Public Health Competencies are located in Appendix C of the CPH Graduate Student Handbook that can be found at:

https://go.osu.edu/cphgradcompetencies

References: Selected journal articles and websites.

Chris Chatfield (1995) *Problem Solving: A Statistician's Guide*, 2nd Edition. Chapman & Hall/CRC.

Gerald van Belle (2008) *Statistical Rules of Thumb*, 2nd Edition, John Wiley & Sons.

Grading: Final class grade will be determined as follows:

70% Homework (7 homeworks; 10% per homework)
20% Collaborative Participation
10% Seminar Participation (2 written reflective summaries of seminar attended; 5% each)
A final score of 80% or higher is needed for a satisfactory grade in the course.
This course is graded as S/U.

Exams

Not applicable

Assignments

Homework assignments will cover the following types of situations:

1. Online certification in human subjects research.
2. Prepare a written critique of a journal article or grant application.
3. New projects in the design phase. Student writes a report on the background of the project, including the biological background, and outlines a proposed design and analysis.
4. Statistical analysis and write-up of research data.

Carmen

Supplemental course material will be posted on Carmen.

Class Policies

Students are expected to bring their laptops to all class sessions. The use of cell phones during class is prohibited.

Writing Center: At the Writing Center, we can help with any assignment (ranging from lab reports to dissertations) at any stage of the writing process (brainstorming, thesis development, revising, etc.). Sign up for scheduled appointments (45-minute face-to-face and CarmenConnect) using our online appointment scheduling, available 24/7 at https://cstw.osu.edu/writing-center/schedule-appt

- Face-to-face, 45 minute tutorials by appointment at our main location in 4120A Smith Labs, Monday through Friday, 9am-5pm!
- Online tutoring sessions via CarmenConnect by appointment.
- Face-to-face, 25 minute walk-in appointments at our satellite locations:
    - Thompson library 1st floor, Monday-Thursday, 11am-3pm and 5-7pm.
    - Research Commons, 18th Ave. Library 3rd floor, Monday-Friday, 3-5 pm.

Office of Student Life: 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 specific needs. Please contact the Office of Student Life: Disability Services at 614-292-3307 in Room 098 Baker Hall 113 W. 12th Ave. to coordinate reasonable accommodations for students with documented disabilities (http://www.ods.ohio-state.edu/).

Mental Health Services
As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-- 292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614--292--5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-- 800--273--TALK or at suicidepreventionlifeline.org.

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 School'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/home.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.

Tentative Course Outline

Week	**Topic**	**Guest Lecturer/ Reading Assignments (posted on Carmen)**
1(1/09)	Biostatistical collaboration and team science review Human Subject Research/Ethical and Regulatory Issues (CITI certification)	CITI certification material: http://orrp.osu.edu/irb/training-requirements/citi/citiinstructions/
2(1/23)	Searching the Health Sciences and Statistical Literature	Fern Cheek and Danny Dotson, OSU Libraries
3(1/30)	Elements of a biomedical protocol and NIH grants/Statistical formulation of scientific hypotheses	Sample R21 application Writing Effective Critiques
4(2/06)	Case Study I*	Alice Hinton, Clinical Research Data Manager, Division of Biostatistics
5(2/13)	Designing a study	Selected rules from *Statistical Rules of Thumb*, Second edition, Gerald van Belle (2008).
6(2/20)	Analyzing the Data – General Strategy; Initial Examination; Graphical Displays Sample size estimation	ggplot2 for graphical displays Chatfield, C. (1985). The initial examination of data (with discussion). *JRSS(A)*, 148, 214-53.
7(2/27)	Consultation and Collaboration Effective Report Writing	IMRAD format

8(3/06)	Tools for enhancing scientific rigor and reproducibility	R Markdown, Sweave, StatTag
9(3/20)	Case Study II	Case applications
10(3/27)	Case Study III	Erin Hade, Research Assistant Professor, Center for Biostatistics
11(4/03)	Case Study IV	Jessica Kohlschmidt & Deedra Nicolet, OSU Comprehensive Cancer Center
12(4/10)	Case Study V	Dave Kline, Research Scientist, Center for Biostatistics
13(4/17)	Case Study VI	Research Commons: Data Management
14(4/24)	Biostatistical research	What makes a good applied methods paper/ Statistical Research Amstat News 2013

*Case Studies involve a medical/public health collaborator and depend on ongoing projects.