

PH520: Biostatistics

Summer 2019

Instructor: Colin Farrell, PhD., MPH

Office: Academic Complex (AC) 128A

Office Hours: By Appointment Only (in-office, skype, or telephone)

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Email is the best way to contact me, as I will not be able to answer any phone calls if I am not in the office, and during the summer I am rarely in the office.

Required Materials

- Calculator
- SPSS 25

Recommended Text

- Statistics for the Life Sciences, 5th ed., Samuels, Witmer, and Schaffner (ISBN: 978-0321989581)

Course Description

Application of statistical theory and principles in public health and related disciplines. Emphasis is placed on developing and testing hypotheses, utilizing appropriate statistical methodology, and the use of appropriate technology.

Course Goals or Overview

The purpose of this course is to prepare you for the minimal analytic requirements of a Public Health career. What this means is that you will be expected to have a solid understanding of all aspects of the analysis: Know *when* is it appropriate to use a specific method, opposed to another, and *why* you are using that method. Furthermore, *how* do you interpret the results? Assuming that I do my job, and you do your job, you should be able to leave this class being able to identify the most appropriate type of analysis for your project based on the type of research question and articulate the results in a manner that the general public can understand.

Course Objectives

1. Differentiate between the multiple scales of measurement.
2. Examine the role of quantitative and qualitative methods and sciences in describing and assessing a population's health.*
3. Apply various statistical methods based on the type of research question and the nature of the data.
4. Discover the applicability and limitations of bivariate analyses of difference and relationship.
5. Demonstrate the ability to articulate a thorough and accurate interpretation of the analysis in a manner that would be clear to the general population.
6. Design statistical analysis utilizing multiple software programs with the interest of addressing specific research question.

7. Evaluate the relationship between research question, hypothesis, analysis, and interpretation.
8. Investigate multiple sources of statistical error, and articulate how statistical error influences analysis.
9. Examine the critical importance of evidence in advancing public health knowledge*

** denotes foundational knowledge objective*

Course Assessments/Requirements

CITI Training Certificate: Completion of the CITI training certificates (IRB training) is a mandatory component of PH 520. Failure to complete the CITI training will result in an incomplete for the course, until said certificate is received. Per WKU policy, an 'incomplete' transitions to an 'F' after a defined amount of time. Directions for completion of the training will be provided on Blackboard during the first week of class.

Assignments (17.5%): Throughout the term, you will have multiple homework assignments. These assignments are intended to evaluate your ability to apply the statistical methods we cover in class, while also giving you additional practice in identifying data (sources), manipulating data sets, and utilizing SPSS to analyze data.

These homework assignments will include the use of existing data sets, which can be found on Blackboard, as well as datasets publicly available on the internet. Homework accounts for a total of 15%, with that percentage being equally distributed across all assignments. ***Late submissions will be considered on a case-by-case basis. (Objectives 1-9)***

Quizzes (22.5%): Over the course of the term, you will be required to take two (2) scheduled quizzes and multiple unscheduled quizzes. These quizzes will be structured in such a way as to evaluate your understanding of the content we have covered. All quizzes will be timed, with the allotted amount of time being communicated prior to the start of the quiz. Any missed quiz will be scored as a zero. ***Late submissions will be considered on a case-by-case basis. (Objectives 1, 3, & 5)***

Midterm Exam (20%): The examination for this course will be based off all the course material (text and any additional material provided within the lectures) and any blackboard discussions that pertain to the specified chapters. The exam will evaluate your ability to calculate and interpret the correct results, as well as perform the necessary methods using SPSS. The Midterm Exam will be timed, with the student being provided 2 hours and 45 minutes to complete the assessment. I reserve the right to adjust the dates and formats of the midterm exam as I see fit. ***(Objectives 1, 3, 5, & 6)***

There are certain circumstances in which a student will be allowed to make-up the midterm exam or quizzes, such as when he or she possesses a note from a physician from the day of the assessment, or spanning the relevant date. Other instances that will be permissible to make-up an exam or quiz: funerals, automobile accidents, and legal obligations (list not exhaustive: circumstances considered on case-by-case basis). **STUDENTS WILL HAVE ONE WEEK FROM THE DATE OF THE EXAM TO MAKE-UP THE MISSED ASSESMENT. IF YOU ARE UNABLE TO MEET THESE GUIDELINES, YOU MUST CONTACT ME WITHIN THAT WEEK TO INFORM ME. IF THE EXAM IS NOT TAKEN, OR MADE-UP WITHIN THE FIRST WEEK FOLLOWING THE MISSED DATE, IT WILL BE COUNTED AS A ZERO.**

Final Exam (25%): The Final Exam will cover all content from the semester. The Final Exam will be timed, with the student being provided 2 hours and 45 minutes to complete the assessment. **No late submissions will be accepted.** (Objectives 1, 3, 5, & 6)

Article Summaries and Presentation (15%): During the course, you will be required to read and summarize one (1) article with the intent of understanding and communicating the statistical results of the studies. The summary will be submitted via links on Blackboard and account for 15% of the final grade. You will also be required to present the findings of the articles and discuss why the findings matter in an oral presentation. (Objectives 2, 5, 7, & 9)

Grading

A: 100%-90%

B: 89.99%-80%

C: 79.99%-70%

D: 69.99%-60%

F: <60%

Your final grade will be calculated using the following weights:

Homework Assignments: 17.5%

Quizzes: 22.5%

Midterm Exam: 20%

Final Exam: 25%

Article Summaries (9%) and Presentation (6%): 15%

Academic Dishonesty

Students who commit any act of academic dishonesty may receive from the instructor a failing grade in that portion of the course work in which the act is detected or a failing grade in a course without possibility of withdrawal. The faculty member may also present the case to the Office of Judicial Affairs for disciplinary sanctions. A student who believes a faculty member has dealt unfairly with him/her in a course involving academic dishonesty may seek relief through the Student Complaint Procedure.

Title IX Sexual Misconduct/Assault

Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at

<https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf> and

Discrimination and Harassment Policy (#0.2040) at

https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the

University and **MUST** report what you share to WKU’s Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU’s Counseling and Testing Center at 270-745-3159.

Disability Accommodations

In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at sarc.connect@wku.edu . Please do not request accommodations directly from the professor or instructor without a faculty notification letter (FNL) from The Student Accessibility Resource Center.

I enforce a strict no-discrimination policy within my classroom and within my office. This means that there will be no discriminating or disparaging of individuals based on any characteristic – race, gender, gender identity, religion, disability, age, or sexuality. Anyone who does discriminate will be subject to the policies defined in the code of conduct within the Western Kentucky University handbook.

Food Insecurity

Food insecurity is a condition where an individual does not have adequate resources to feed themselves and/or their family, either nutritiously or not at all (USDA, 2013). Food insecurity is a common issue at colleges and universities across the United States, and may impact academic success (Hunger on Campus, 2016). If food insecurity is an issue for you, or someone you know, help is readily available. Please contact the WKU Office of Sustainability at (270) 745-2508, send an email to sustainability@wku.edu, or visit www.starvingtolearn.com.

MPH Competencies

Even if your courses is not a core course, please identify the key competencies addressed by the course. Please do not list the competencies that are addressed superficially. Please show where your learning objectives align with the competencies. You may want to have a statement such as:

This course contributes to the development of the following competencies:

Evidence-based Approaches to Public Health	Obj.	Assessments
1. Apply epidemiological methods to the breadth of settings and situations in public health practice		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	2	Assignments 3-5, Quiz 2, Midterm Exam, Final Exam
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	3, 6	Assignment 2-5, Midterm Exam, Final Exam
4. Interpret results of data analysis for public health research, policy or practice	5	Assignments 3-5, Quiz 1 & 2, Midterm Exam, Final Exam, Article Summaries
Public Health & Health Care Systems		
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		

6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels		
Planning & Management to Promote Health		
7. Assess population needs, assets and capacities that affect communities' health		
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs		
9. Design a population-based policy, program, project or intervention		
10. Explain basic principles and tools of budget and resource management		
11. Select methods to evaluate public health programs		
Policy in Public Health		
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		
15. Evaluate policies for their impact on public health and health equity		
Leadership		
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		
17. Apply negotiation and mediation skills to address organizational or community challenges		
Communication		
18. Select communication strategies for different audiences and sectors		
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	5	Assignments 2-5, Quiz 1 & 2, Midterm Exam, Final Exam, Article Summaries
20. Describe the importance of cultural competence in communicating public health content		
Interprofessional Practice		
21. Perform effectively on interprofessional teams		
Systems Thinking (waiting on technical assistance paper from CEPH)		
22. Apply systems thinking tools to a public health issue		
WKU MPH Program Competencies		
1. Apply health behavior theories and models to address public health problems.		
2. Describe the role of budgeting; methods of seeking extramural funding; and methods of financial analysis in making decisions about policies, programs and services.		
3. Describe the roles of history, power, privilege and structural inequality in producing health disparities.		
4. Integrate social determinants into public health science, practice, and research.		
5. Identify the direct and indirect population health effects of environmental hazards (biological, chemical and physical) on humans, animals and the ecology.		

Foundational Knowledge

The following foundational knowledge requirements are assessed in PH 520.

Profession & Science of Public Health	Obj	Assessments
1. Explain public health history, philosophy and values		
2. Identify the core functions of public health and the 10 Essential Services.		
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health	2	Assignments 2-5, Quiz 1 & 2, Midterm Exam, Final Exam
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program		
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.		
6. Explain the critical importance of evidence in advancing public health knowledge	9	Article Summaries
Factors Related to Human Health		
7. Explain effects of environmental factors on a population's health		
8. Explain biological and genetic factors that affect a population's health		
9. Explain behavioral and psychological factors that affect a population's health		
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities		
11. Explain how globalization affects global burdens of disease		
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)		

Course Topics/Schedule

Week 1 (May 13-May 19)	<p>Complete CITI Training Certificate</p> <p>Topic 1 General Introduction of Content</p> <p>Topic 2 Samples and Populations; Statistical Error</p> <p>Topic 3 Scales of measurement, Data collection, Data presentation</p> <p>Topic 4 Data coding and Data entry</p>
Week 2 (May 20-May 26)	<p>Topic 5 Probability, Binomial Distribution</p> <p>Topic 6 Normal Curve</p>
Week 3 (May 27-June 2)	<p>Quiz 1 – Material from Week 1 & Week 2 (Due Date: May 30, 11:59 PM)</p> <p>Topic 7 Single Sample Analyses</p> <p>Topic 8 Paired Sample Analyses</p>
Week 4 (June 3-June 9)	<p>Midterm Exam – Material from Week 1-Week 3 (Due Date: June 9, 11:59 PM)</p> <p>Topic 9 Independent Samples Analyses</p> <p>Topic 10 ANOVA</p>
Week 5 (June 10-June 16)	<p>Quiz 2 – Material from Week 4 (Due Date: June 13, 11:59 PM)</p> <p>Topic 11 Chi- Square</p> <p>Topic 12 Correlation</p>
Week 6 (June 17-June 22)	<p>Article presentations and submissions (Due Date: June 22, 11:59 PM)</p> <p>Final Exam – Comprehensive (Due Date: June 22, 11:59 PM)</p>

Important Dates:

- May 14, 2019 Class Begins
- May 30, 2019 Quiz 1 (Due Date)
- May 31, 2019 Last day to withdraw from course (No refund after May 17)**
- June 9, 2019 Midterm Exam (Due Date)
- June 13, 2019 Quiz 2 (Due Date)
- June 22, 2019 Final Exam (Due Date)

The above schedule is subject to change, based on a number of factors – class comprehension, class performance, unforeseen events, and class interest in specific topics. As circumstances arise, changes will obviously need to be made to the subsequent weeks. Those changes will be addressed as the need is presented.