DPHS 703

Applied Analytic Methods for Population Health Sciences I

Fall 2019

Dates / course meeting time: Tuesdays from 8:30 – 10am
Academic credit: 1.0
Course format: Lecture + Discussion + Data Analysis
Office Hours: 7:30-8:30 AM Tuesday (in the classroom)
11:30-12:30 Monday with Dr. Coles
11:30-12:30 Thursday virtually

Instructors

Jared Dean MS
jared.dean@duke.edu

What is this course about?

This course will introduce you to study design, descriptive statistics, and analysis of statistical models with one or two predictor variables. You will learn descriptive statistics, sampling, contingency tables, one- and two-way analysis of variance, simple linear regression, and analysis of covariance. We will also explore parametric and nonparametric data analysis techniques. You will learn core concepts through team-based case studies and analysis of research datasets taken from the population health sciences literature. Most of the course content will be reinforced through programming exercises you will do in concert with PHS 503 (Introduction to Statistical Programming for Population Health Sciences). Computational exercises will primarily use the SAS Statistical Computing Platform.

What background knowledge do I need before taking this course?

- At least one course in introductory statistics, or equivalent work experience
- At least one college-level math course, calculus or higher (e.g., calculus, linear algebra)
- Concurrent enrollment in PHS 701

What will I learn in this course?

- Apply numerical and graphical techniques to summarize data
- Understand hypothesis testing, estimation of confidence intervals, and p-values
- Choose and perform tests to analyze data from one or two samples
- Understand study design considerations related to power and sample size
- Conduct statistical analyses in modern statistical software and interpret the results

How will my grade be calculated?

Problem Sets (40 of 100 points)**.** All problem sets will be based on empirical application of methods covered during the prior lectures. Problem sets will address data analysis problems presented in class that will have to be worked out. Data analysis problems will require each student to generate analysis and output that will be made available in the first week of class. One or two homework assignments will be assigned nearly every week.

Mid-term Exam (30 of 100 points)**.** The mid-term exam will be an in-class exam given in Week 7, which will cover all of the material addressed up to that point. The purpose of the mid-term is to identify your mastery of course content and identify content that you may need to revisit to increase your understanding.

Final Exam (30 of 100 points)**.** The final exam will be an in-class exam given on the last day of the course, which will cover all the material over the quarter. The purpose of the exam will be to extend your thinking about issues through the application of methods presented in class.

How can I prepare for the class sessions to be successful?

Prior to each class, you will need to complete the reading assignment(s) and the homework assignment relevant to that day's discussion, which you will submit on Sakai by 5pm the night before (please see course schedule below). You should bring either a calculator or laptop to class to assist you with any calculations you need to do for the group work or other class activities. You should come prepared to participate in class discussions and exercises.

What required texts, materials, and equipment will I need?

The Sakai course website will contain all information you need about the course, including the syllabus, schedule, policies, links to submit the homework assignments. We will also post any announcements relevant to the course here, so please check it often. The course website is located here:

https://sakai.duke.edu/portal/site/8b916fdc-5211-4b88-b9b6-4988c5ca57f2

The required textbook for this course is: Delwiche, Lora D, and Susan J. Slaughter. The Little SAS Book: A Primer. Cary, NC: SAS Institute, 2012. Print.

https://www.amazon.com/Little-SAS-Book-Primer-Fifth-ebook/dp/B00B29H9HU

What optional texts or resources might be helpful?

SAS Communities (https://communities.sas.com)
SAS Programming I (https://support.sas.com/edu/schedules.html?ctry=us&crs=PROG1)

What are the course policies?

Course attendance

Students are expected to attend classes regularly and complete assigned coursework in a timely fashion in accordance with the expectations of their instructors. Students will be response for material covered in class regardless of attendance.

On academic integrity:

The faculty, staff, students, and affiliates of the Department of Population Health Sciences adhere to the Duke Community Standard:

Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and nonacademic endeavors, and to protect and promote a culture of integrity.

To uphold the Duke Community Standard:

- I will not lie, cheat, or steal in my academic endeavors;
- I will conduct myself honorably in all my endeavors; and
- I will act if the Standard is compromised.

More information on students' responsibilities regarding the Duke Community Standard can be found here.

On class attendance:

Each instructor in the Department of Population Health Sciences develops their own course attendance policy; if no other policy is directly stated, all DPHS courses adhere to the following: students are allowed up to three missed class meetings during an academic semester, with prior instructor approval. Absences beyond or outside of this allotment may result in consequences for the student. Students are expected to follow an individual course instructor's attendance policy, or, in the absence of such a policy, the policy stated here.

On diversity:

Duke University Institutional Statement of Commitment to Diversity and Inclusion

Duke aspires to create a community built on collaboration, innovation, creativity, and belonging. Our collective success depends on the robust exchange of ideas—an exchange that is best when the rich diversity of our perspectives, backgrounds, and experiences flourishes. To achieve this exchange, it is essential that all members of the community feel secure and welcome, that the contributions of all individuals are respected, and that all voices are heard. All members of our community have a responsibility to uphold these values.

On laptop & cell phone use in class: There is evidence that the use of laptops can distract students from classroom learning and participation. Clearly, there will be data-driven aspects of the course that will require use of software on laptops, so we would ask you to make use of your laptop in a thoughtful way that facilitates learning by you and other students.

"If your laptop is open, your hand is raised" – the idea behind this is that laptops are not a Do Not Disturb sign if you choose to use them during class; rather, they indicate to instructors that you are fully engaged in the class discussion and ready to respond if asked to participate.

Children in Class:

It is my belief that if we value learning at all ages in academia, that we should also expect children to be present in some form. Currently, the university does not have a formal policy on children in the classroom. The policy described here is thus, a reflection of my own beliefs and commitments to student, staff and faculty parents.

1) All exclusively breastfeeding babies are welcome in class as often as is necessary to support the breastfeeding relationship. Because not all women can pump sufficient milk, and not all babies will take a bottle reliably, I never want students to feel like they have to choose between feeding their baby and continuing their education. You and your nursing baby are welcome in class anytime.

2) For older children and babies, I understand that minor illnesses and unforeseen disruptions in childcare often put parents in the position of having to chose between missing class to stay home with a child and leaving him or her with someone you or the child does not feel comfortable with. While this is not meant to be a long-term childcare solution, occasionally bringing a child to class in order to cover gaps in care is perfectly acceptable.

3) I ask that all students work with me to create a welcoming environment that is respectful of all forms of diversity, including diversity in parenting status.

4) In all cases where babies and children come to class, I ask that you sit close to the door so that if your little one needs special attention and is disrupting learning for other students, you may step outside until their need has been met. Non-parents in the class, please reserve seats near the door for your parenting classmates.

5) Finally, I understand that often the largest barrier to completing your coursework once you become a parent is the tiredness many parents feel in the evening once children have *finally* gone to sleep. The struggles of balancing school, childcare and often another job are exhausting! I hope that you will feel comfortable disclosing your student-parent status to me. This is the first step in my being able to accommodate any special needs that arise. While I maintain the same high expectations for all student in my classes regardless of parenting status, I am happy to problem solve with you in a way that makes you feel supported as you strive for school-parenting balance. Thank you for the diversity you bring to our classroom!

What campus resources can help me during this course?

Full list of graduate student resources: https://gradschool.duke.edu/student-life/student-resources

Specific resources that may be useful:
IT support: https://gradschool.duke.edu/student-life/student-resources#InformationTechnology
Duke Libraries: https://library.duke.edu/
Tutoring: https://stat.duke.edu/phd/current-students/tutoring
Academic Calendar: https://registrar.duke.edu/calendars-key-dates/future-academic-calendar

What is the expected course schedule?

Pre-Class work will primarily be from the The Little SAS Primer (LSP) I've included the TOC so that if you don't have the 5th edition you can find the relevant sections.
Topics could move during the semester.

Session 1	
Date	Tuesday, 8/27/19
Class topic/unit name	• Introductions • Syllabus overview • Review Accessing SAS and R • How to complete HW • Introduction to SAS
Pre-class reading	LSP 1.3, 1.8, 1.10, 2.18 - 2.20
Assignments due	None

Session 2	
Date	Tuesday, 9/3/19
Class topic/unit name	• Performing Descriptive Statistics • SAS DATA Step • PROC FREQ • PROC MEANS
Pre-class reading	LSP 4.10-4.17
Assignments due	Week1 homework

Session 3	
Date	Tuesday, 9/10/19
Class topic/unit name	• Univariate Analysis • Hypothesis testing • PROC UNIVARIATE • PROC TTEST
Pre-class reading	LSP 9.1-9.9

Assignments due	Week2 homework

Session 4	
Date	Tuesday, 9/17/19
Class topic/unit name	• Performing Confidence Intervals • ODS Graphics
Pre-class reading	None
Assignments due	Week3 homework

Session 5	
Date	Tuesday, 10/1/19
Class topic/unit name	• Performing Inference analysis for one and two samples
Pre-class reading	None
Assignments due	Week4 homework

Session 6	
Date	Tuesday, 10/8/19
Class topic/unit name	• Creating contingency tables in SAS and R
Pre-class reading	None
Assignments due	Week5 homework

Session 7	
Date	Tuesday, 10/15/19
Class topic/unit name	• Non-parametric tests • Mid-Term Review
Pre-class reading	None
Assignments due	Week6 homework

Session 8	
Date	Tuesday, 10/22/19
Class topic/unit name	• Mid-Term
Pre-class reading	None
Assignments due	Week7 homework

Session 9	
Date	Tuesday, 10/29/19
Class topic/unit name	• Compute Power and Sample Size
Pre-class reading	None
Assignments due	None

Session 10	
Date	Tuesday, 11/5/19
Class topic/unit name	• Analysis of Variance • Correlation
Pre-class reading	None
Assignments due	Week9 homework

Session 11	
Date	Tuesday, 11/12/19
Class topic/unit name	• Linear Regression
Pre-class reading	None
Assignments due	Week10 homework

Session 12	
Date	Tuesday, 11/19/19
Class topic/unit name	• Linear Regression
Pre-class reading	None
Assignments due	Week11 homework

Session 13	
Date	Tuesday, 11/26/19
Class topic/unit name	• Final Exam
Pre-class reading	None
Assignments due	None