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PUBH 520.50: Fundamentals of Biostatistics

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Fundamentals of Biostatistics

(PUBH 520)

*University of Montana
School of Public and Community Health Sciences
Fall 2022 – August 29th thru December 17th*

Course Details

Instructor	Jonathon Knudson
Email	jonathon.knudson@mso.umt.edu
Lecture	Non-concurrent class – NA
CRN	70888
Office Hours	Please schedule Office Hour meetings via: Booking Link M W F 9 am – 5 pm MST * other times by appointment

Course Description

Introduces basic vocabulary, concepts, and methods of biostatistics. The goal is to provide an introduction to how biostatistics works. Topics will include descriptive statistics, probability, random variables, probability distributions, statistical inference, and chi-square analysis. This course will also provide an introduction to data science and statistical programming through the language R.

Council on Education for Public Health (CEPH) Master's Foundational Competencies

Competency Number	Competency Description
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.
3	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software as appropriate.
4	Interpret results of data analysis for public health research, policy or practice.

Competency Number	Competency Description
18	Select communication strategies for different audiences and sectors.
Master's Generalist Concentration-Specific Competencies	
1	Gather, integrate and analyze descriptive health data from rural or frontier settings.
5	Utilize basic statistical skills to reason about problems associated with the populations of low density and widespread geographic dispersion.

Textbooks and Softwares

Required Texts:

Essentials of Biostatistics in Public Health, 3rd Edition
 Lisa M Sullivan
 ISBN: 9781284108194

As with all college courses, the textbook is considered one of the definitive sources of information for this course. All lectures are derived from the text and supplemented with instructor knowledge. Homework sets will be based on those problems in the text at the end of each chapter. Students should keep up with assigned readings through the semester.

Required Software:

RStudio (Soon to become POSIT)
<https://www.rstudio.com/>

Supplemental (Optional) Texts:

R for Data Science
 Hadley Wickham and Garrett Grolemund
<https://r4ds.had.co.nz/>

Course Websites

This course will use a number of websites to share information, and students are encouraged to familiarize themselves and bookmark all of these for the semester.

UMOnline (Moodle)

The central source of information for this course will be UMOOnline. Link's to lecture videos will be shared on a weekly basis, along with PDF copies of the presentation given and any additional resources necessary. Communication to students about the course will primarily come through UMOOnline and the gradebook in UMOOnline will be my primary focus for recordkeeping purposes. There will also be a forum available to ask questions and help your fellow students with R and statistical questions. Finally, Exams and Quizzes will also be through UMOOnline.

YouTube

Each week, I will upload videos to YouTube and share the links to each video on Moodle. I anticipate that each week will have one video for general lecture material from the book, and a second video demonstrating the relevant materials in R. Additional videos may be provided as needed. Note that often these videos will be from previous semesters, but the information is still up to date.

Grading Policy

Grades will be determined on a traditional letter scale (A: 100-90, B: 90-80, etc) with plus/minus assigned based on final grade distribution and overall performance throughout the semester. Grades will be the result of assigned materials with the following breakdown for which portion of final grades each section accounts for.

Exams	30%
Midterm	10%
Final	20%
Projects	30%
Project 1	10%
Project 2	20%
Homework	40%

Exams Policy

Exams will become available each week and will be due at midnight MST on the days listed below.

Exam	Date Available	Due Date
Midterm Exam	November 7	November 13
Final Exam	December 10	December 17

Exams cannot be completed once the due date has passed. If you will miss an exam, please contact me as soon as possible to make accommodations where possible. Exams will be administered through UOnline and will be open book. Exams will assess your knowledge of the Biostatistic methods taught in this course and will not rely on R to complete. Students will be provided with a journal article familiarizing them with the dataset used during the exam and are expected to read and be familiar with this information before starting the exam. During the exam, students will receive a supplemental document containing the results of statistical analysis and will be expected to use this to complete the exam.

Project Policy

Projects will be the assessment for how well students are understanding R and to provide a more realistic view of what work may look like outside of the classroom. A dataset and list of tasks will be provided, detailing what work should be completed in R and a variety of questions students will answer in the form of a report. Students will provide a copy of their R code, a PDF or Microsoft Word document with answers to the questions provided, and additional materials as requested (i.e. graph images). The due dates for each project are as follows:

- Project 1 due 11 pm MST on October 9
- Project 2 due 11 pm MST on December 11

Homework Policy

Homework assessments will become available each week on Monday and will be due at midnight MST on Sunday of the week, not including weeks with projects or tests. Please keep an eye on these due dates and make sure to complete assignments before midnight of each week. Late work will have an initial penalty of 10% and which will increase as the later the work is turned in.

Homework assignments are meant to assess how well a student is understanding both the Biostatistics and the Data Science portions of the course. Students will be asked to perform various tasks in R and then answer questions based on their findings. Students will upload their R file each week in the Moodle homework assignment available. In addition, students will be asked a series of questions and should answer in short essay format; it matters more to me that you use as few words as necessary to convey your point but all work for this course should be completed in full and complete sentences.

When submitting homework documents, students are expected to use the following naming convention for their R files:

pubh520_hw#_lastname.R

Other Course Policies

Given the heightened likelihood that these situations will occur through the semester, I want to give you assurance of what my approach and policy will be. These policies are subject to change and such changes will be communicated if they occur.

Illness

In the event you get sick, please **TAKE YOUR TIME AND GET BETTER**. Let me know as soon as possible and we will set a schedule to get caught back up when you start feeling better. Curry Health Center is able to provide testing for COVID-19, as can the Missoula City-County Health Department. Please be proactive in keeping me in the loop.

Personal (Self) Care

A student can't learn if their mind isn't ready for it. The last 2 years have created an enormous amount of stress for everyone, often from many sources and of different natures. Given many of the students in this class are also working professionals, I understand that some weeks work well and some weeks don't. I have personally used the Curry Counseling Center and can attest they are wonderful professionals. Students have 10 appointments available for a very reasonable and low cost (does not require any insurance) each year, with the options for more as necessary. They are also able to refer you to a provider in Missoula (or elsewhere) if necessary. These services are also available via telehealth for students not in Missoula and I personally encourage you to use these resources when you could use some help.

Academic Integrity

The University of Montana Student Code of Conduct (<http://www.umt.edu/student-affairs/community-standards/default.php>) embodies and promotes honesty, integrity, accountability, and duties associated with citizenship as a student in our community at the University of Montana. This Code exists to protect the interests of the community and dignity of its members, and to challenge those behaviors which are not in accordance with our policies. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students' rights, responsibilities, and the campus processes for adjudicating alleged violations.

Students with Disabilities

The Office for Disability Equity (ODE) is the campus resource for disability-related information. They provide consultation, training, and academic services to advance accessibility and inclusion by taking an intersectional approach to disability. For more information, please visit their website: <https://www.umt.edu/disability/>.

Final Thoughts

If at any point you need help or there is a struggle with some part of this class, please reach out to me! Distant learning can be difficult but I am adamant that this semester be a successful opportunity for all. Finally, I reserve the right to modify this or any part of the class as needed.

Course Schedule (Tentative)

Week	Assigned Readings	Topics Covered	What I Give You	What You Give Me	Due Date
1	Chapter 1	Intro to Biostats	Videos: <ul style="list-style-type: none"> • Course Intro • Week 1 Lecture • Week 1 R Example Files: <ul style="list-style-type: none"> • Week 1 R Example 	Homework 1: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Sept 4
2	Chapter 2	Study Design and Bias	Videos: <ul style="list-style-type: none"> • Week 2 Lecture • Week 2 R Example Files: <ul style="list-style-type: none"> • Week 2 R Example 	Homework 2: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Sept 11
3	Chapter 4	Summarizing Data and Variables	Videos: <ul style="list-style-type: none"> • Week 3 Lecture • Week 3 R Example Files: <ul style="list-style-type: none"> • Week 3 R Example 	Homework 3: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Sept 18
4	Chapter 3	Descriptive Epidemiology	Videos: <ul style="list-style-type: none"> • Week 4 Lecture • Week 4 R Example Files: <ul style="list-style-type: none"> • Week 4 R Example 	Homework 4: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Sept 25

Week	Assigned Readings	Topics Covered	What I Give You	What You Give Me	Due Date
5 & 6		Project 1	Video: <ul style="list-style-type: none"> Project 1 Description Files: <ul style="list-style-type: none"> Project 1 Requirements, Questions and Instructions 	Project Files: <ul style="list-style-type: none"> R File made from instructions Word or PDF report 	Oct 9
7	Chap 5 sec 1-6.1 & Chap 6 sec 1, 3, 6	Categorical Var: Probability and Confidence Intervals	Videos: <ul style="list-style-type: none"> Week 6 Lecture Week 6 R Example Files: <ul style="list-style-type: none"> Week 6 R Example 	Homework 5: <ul style="list-style-type: none"> R File made from instructions Short essay answers completed through Moodle 	Oct 16
8	Chapter 7 sec 3, 4, 7, 9, 10	Categorical Var: Hypothesis Testing	Videos: <ul style="list-style-type: none"> Week 7 Lecture Week 7 R Example Files: <ul style="list-style-type: none"> Week 7 R Example 	Homework 6: <ul style="list-style-type: none"> R File made from instructions Short essay answers completed through Moodle 	Oct 23
9	Chap 5 sec 6.2-sum & Chap 6 sec 1, 2, 4, 5, 7	Continuous Var: Probability and Confidence Intervals	Videos: <ul style="list-style-type: none"> Week 8 Lecture Week 8 R Example Files: <ul style="list-style-type: none"> Week 8 R Example 	Homework 7: <ul style="list-style-type: none"> R File made from instructions Short essay answers completed through Moodle 	Oct 30
10	Chapter 7 sec 1, 2, 5, 6, 10	Continuous Var: Hypothesis Testing	Videos: <ul style="list-style-type: none"> Week 9 Lecture Week 9 R Example Files: <ul style="list-style-type: none"> Week 9 R Example 	Homework 8: <ul style="list-style-type: none"> R File made from instructions Short essay answers completed through Moodle 	Nov 6

Week	Assigned Readings	Topics Covered	What I Give You	What You Give Me	Due Date
11		Midterm	Video: <ul style="list-style-type: none"> • Review • Journal Article Files: <ul style="list-style-type: none"> • Review Notes 	Exam on Moodle	Nov 13
12	Chapter 10 sec 1-3	Non-parametric approaches	Videos: <ul style="list-style-type: none"> • Week 11 Lecture • Week 11 R Example Files: <ul style="list-style-type: none"> • Week 11 R Example 	Homework 9: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Nov 20
Thanksgiving Break					
13	Chapter 10 sec 4-sum	Non-parametric approaches	Videos: <ul style="list-style-type: none"> • Week 12 Lecture • Week 12 R Example Files: <ul style="list-style-type: none"> • Week 12 R Example 	Homework 10: <ul style="list-style-type: none"> • R File made from instructions • Short essay answers completed through Moodle 	Dec 4
14		Project 2	Video: <ul style="list-style-type: none"> • Project 2 Description Files: <ul style="list-style-type: none"> • Project 2 Requirements and Instructions 	Project Files: <ul style="list-style-type: none"> • R File made from instructions • Word or PDF report 	Dec 11
Finals		Final Exam	Video: <ul style="list-style-type: none"> • Review Files: <ul style="list-style-type: none"> • Review Documents 	Exam on Moodle	Dec 17