PHC6052 Introduction to Biostatistical Methods (3 credit hours)

Fall 2022
Delivery Format: Online (asynchronous)
Course Materials and Assignments: http://elearning.ufl.edu/

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                        See Canvas page for further information.
Teaching Assistant: TBD (TBD@ufl.edu)
Preferred Course Communications:

- Ask about specific questions or issues of a personal nature by email through the Canvas inbox in E-learning.
- Ask more general questions (NOT personal or specific quiz questions) on the discussion board in E-learning.
- I know a number of you work during the day. I will do my best to accommodate appointments in the evenings if given a few days' notice.
- **NOTE: My email address is jfischer1@ufl.edu. There is another person with a nearly identical name and similar email address. Consequently, I prefer you use the Canvas inbox. However, if you need to email me directly, be sure to use the correct address as shown here. I typically respond to questions within one business day, so please verify that you used the correct address if you don't receive a response in that time.**

Prerequisites
There are no specific prerequisite courses, but students should be comfortable working with equations, performing basic mathematical calculations (e.g., order of operations, fractions, and square roots), and working with computers.

Purpose and Outcome
Course Overview
Statistical methods for description and analysis provide investigators with useful tools for making sense of data. The pervasiveness of statistics in public health as well as other fields has led to increased recognition that statistical literacy—familiarity with the goals and methods of statistics—should be a basic component of a well-rounded educational program. In this course, students will develop statistical vocabulary, learn methods for descriptive data analysis, study the fundamentals of probability and sampling distributions, learn methods for statistical inference and hypothesis testing based on one or two samples, and become familiar with categorical data analysis and linear regression. Data analysis will be conducted in SAS.

Relation to Program Outcomes
This three-credit course is a required concentration core course for MPH Biostatistics students and covers the following competencies.
- Describe the role of biostatistics in public health research.
- Use appropriate statistical methodology to address public health problems.
- Apply software to conduct statistical analyses.

Course Objectives and/or Goals
Upon successful completion of this course, students will be able to
- CO-1: Describe the role biostatistics serves in the discipline of public health.
- CO-2: Differentiate among different sampling methods and discuss their strengths and limitations.
- CO-3: Describe the strengths and limitations of designed experiments and observational studies.
- CO-4: Distinguish among different measurement scales, choose the appropriate descriptive and inferential

statistical methods based on these distinctions, and interpret the results.
- CO-5: Determine preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
- CO-6: Apply basic concepts of probability, random variation, and commonly used statistical probability distributions.
- CO-7: Use statistical software to analyze public health data.
- CO-8: Develop presentations based on statistical analyses for both public health professionals and educated lay audiences.

Description of Course Content
Topical Outline

Week	Date(s)	Topic(s)
1	8/22-8/26	Unit 1A – EDA for One Variable
2	8/29-9/2	Unit 1B – EDA for Two Variables
3	9/5-9/9	Unit 2 – Producing Data
4	9/12-9/16	Unit 3A – Probability
5	9/19-9/23	Unit 3B – Random Variables
6	9/26-9/30	Unit 3B – Sampling Distributions
7	10/3-10/7	Unit 4A – Estimation
8	10/10-10/14	Unit 4A – Hypothesis Testing
9	10/17-10/21	Unit 4B – Inference for Relationships (Case CQ)
10	10/24-10/28	Unit 4B – Inference for Relationships (Case CQ)
11	10/31-11/4	Unit 4B – Inference for Relationships (Case CC)
12	11/7-11/11	Unit 4B – Inference for Relationships (Case QQ)
13	11/14-11/18	Review Inference for Relationships
14	11/21-11/25	Biostatistical Ethics & Happy Thanksgiving!
15	11/28-12/2	Additional Topics in Regression
16	12/5-12/9	Additional Topics in ANOVA

A detailed schedule of assignments with due dates can be found at the end of the syllabus.

Course Materials and Technology
All course materials are available online through **CANVAS** (http://elearning.ufl.edu). The **online open access textbook** has been converted into a Canvas page that you will have access to, but is also available at http://bolt.mph.ufl.edu. You will also need access to the statistical software package, SAS. There is no required textbook to purchase for this course. However, the following textbooks may serve as useful references with additional examples/exercises:
- Daniel, W.D. (2013): Biostatistics: A Foundation for Analysis in the Health Sciences. 10th Edition, Wiley.
- Agresti, A. (2013): The Art and Science of Learning from Data. 4th Edition, Pearson.

IMPORTANT: Course materials discuss multiple software packages. **In PHC 6052 you are only responsible for SAS**.

Videos
Most videos presented in the course material are stored in YouTube. If the text in the video is too blurry, try increasing the quality of the YouTube video using the small gear icon which appears at the bottom of the video when it is playing. If you want to view the video faster or slower, you can adjust the speed using the gear icon. Many videos have closed captions and/or transcripts available. In addition to these videos, recorded lectures and demos will be

posted at the start of each week. Lectures will largely recap course readings while demos will allow me to walk through examples for you.

Statistical Software – SAS

The current version of SAS is SAS 9.4, and SAS 9.3 or higher is required for this course. There are several options for SAS access:

1) Direct purchase and installation. **This option is only available for Windows users.** SAS can be purchased on campus at the UF computing help desk located at 132 HUB Stadium Road (https://software.ufl.edu/software-listings/sas.html); **this can only be done in-person.** Click on the SAS Student page for SAS program purchase information and online documents. The current cost is $35.

2) SAS is also available, along with other applications such as Microsoft Office, on the free UFApps server (https://info.apps.ufl.edu). To use SAS on UFApps, you will need to learn how to upload and download files to and from the UFApps server. See the Using SAS on UFApps document for specific instructions.

3) SAS also has a free virtual app called SAS OnDemand for Academic. For more information and to get access, see https://www.sas.com/en_us/software/on-demand-for-academics.html. It can be used with any operating system.

4) For some departments, SAS may also be available through their IT group or remote desktop. Check with your own department for SAS access.

I personally recommend option 3, as it will work for all users and doesn't have as many bugs as UFApps. Nevertheless, both 2 and 3 are good (and free!) options, though they require you be able to upload and download files using a remote server (i.e., "the cloud"). Tutorial videos demonstrating these two options are provided, but some students still prefer having the software installed locally on their computers. Note that SAS can only be installed on your computer if you're running a Windows OS.

SAS Tutorials

There are tutorials provided in the online textbook for all skills needed for assignments in this course. We have tried to make it as easy as possible to follow along with the tutorials. Watching the videos at a slower speed can help. Viewing the transcripts while you watch or work in SAS may also help. Whenever possible, many students find it helpful to have the videos playing in one window, monitor, or other device while working in the software in another, pausing as needed to work through the process with your own data.

Recommended SAS Books (optional – extra resources)

Although we will provide tutorials for all SAS skills required for this course, there are numerous guidebooks available if you wish to have additional resources. Many of these books are available both in print and online via the UF library. The best for you may depend on what you might be doing with SAS after our course. Two options we recommend are

- The Little SAS Book: A Primer 5th ed., by Lora Delwiche and Susan Slaughter, SAS Institute: Cary, NC (2012). Available for free through the UF library
- Learning SAS by Example, by Ron Cody, SAS Institute: Cary, NC (2007). Available for free through the UF library

E-learning

An E-Learning site is available for the course (http://elearning.ufl.edu). **The weekly schedule and all course materials are available online through this site including grades, assignments, discussions boards, and other course information. It is very important to check the weekly page and review all announcements carefully.**

Academic Requirements and Grading

Quizzes

There will be untimed quizzes in Canvas which are typically due each **Tuesday by 11:59 pm** covering the material assigned for the review of the previous week. You have the opportunity to take each quiz up to three times before the due date. Your highest of these scores will be recorded. Quizzes test basic definitions and skills and may

sometimes be cumulative in that they will go back and ask earlier questions. We highly recommend that you start your first attempt early and take your three attempts on different days with time for reviewing the course material in between. When you submit a quiz attempt, you will see your grade and will be able to review your quiz attempt. For each question, you will see whether you answered correctly or incorrectly but it will not reveal the correct answer for any you did not answer correctly. There will also be feedback for each question which will direct you to the most important content to review.

Assignments

Most assignments will involve data analysis in software and interpretation and/or certain questions which cannot be easily presented in the quizzes. Assignments will normally be due on **Thursdays at 11:59 pm**, but all assignments except the first and last will require extended work and should be started as early as possible, no later than the week prior to the due date, in order to have time to address any questions or issues. For all **software assignments** in this course, if you do not receive full credit for the software part (Part A), you may resubmit Part A before the deadline for Part B to receive half credit back for your corrections.

Course Project

Each student will individually perform a guided data analysis based upon two (hopefully linearly related) quantitative variables. These variables will then be categorized in two ways (2 levels, 3+ levels). The relationship between the two variables will be investigated using different combinations of variable types. This course project will be completed in 4 steps during the semester.

Discussion

Students in online courses sometimes feel disconnected from the class, their instructor, and their classmates. We recommend that students participate in ungraded discussions on the course e-learning page. These may occur in student-initiated topics or in the prompts that the course staff will post weekly.

Grading

Requirement	% of final grade
Quizzes (15)	15%
Assignments (8)	45%
Software for Assignments (3)	12.5%
Software for Course Project (Steps 1, 2, 3)	12.5%
Course Project Step 4	15%

Points Earned	[93,100]	[90,93)	[87,90)	[83,87)	[80,83)	[77,80)	[73,77)	[70,73)	[67,70)	[63,67)	[60,63)	<60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0

Please be aware that a C- is not an acceptable grade for graduate students. The GPA for graduate students must be 3.0 based on 5000 level courses and above to graduate. A grade of C counts toward a graduate degree only if based on credits in courses numbered 5000 or higher that have been earned with a B+ or higher. More information on UF grading policy may be found at: http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades

Policy Related to Make up Work
All work must be submitted via E-Learning by the exact due date and time. Any late submission or missed work will receive a grade of ZERO unless arrangements have been made ahead of the due date with the instructor. Late submissions or make-ups are acceptable ONLY due to illness or other unanticipated circumstances warranting a medical excuse and resulting in the student missing an assignment deadline, consistent with College policy. Documentation from a health care provider is required. Please note: Any requests for make-ups due to technical issues MUST be accompanied by UF Computing help desk (http://helpdesk.ufl.edu/) correspondence. You MUST e-mail me within 24 hours if you wish to request a make-up.

Policy Related to Required Class Attendance
This is an online course. "Attendance" means you are expected to go through the course materials, take notes, and pay attention to and post in the discussion boards. This is to be done at your own pace, but assignments and quizzes have scheduled deadlines to keep you on track. You are welcome to get ahead if you need flexibility in future weeks. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Student Expectations, Roles, and Opportunities for Input
Expectations Regarding Course Behavior
It's critical to review the weekly page in Canvas and read all announcements carefully. Each week's materials will be clearly identified on the course E-learning site. Students are expected to work through the material as scheduled. It is very important to work through all content contained on this site as directed and ask questions about the material you do not understand. **Working through the content from start to finish is the best approach to achieve a high level of understanding and success in this course.** In addition, it is your responsibility to review the comments and feedback we give on your graded assignments.

Communication Guidelines
Questions about course material should be asked during office hours or posted on the course discussion boards in E- Learning. Questions about specific quiz questions or issues of a personal nature should be sent by email through E-Learning. For questions asked Monday-Thursday, we will try our best to respond within 24 hours. For questions asked Friday-Sunday, we will respond Monday or as soon as possible thereafter.

Academic Integrity
Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:
 "**We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity**."
You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:
"On my honor, I have neither given nor received unauthorized aid in doing this assignment."
It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:
https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/
http://gradschool.ufl.edu/students/introduction.html
Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Online Faculty Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/ . Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

ADVICE

All that I can ask is that you do your best with the provided materials and to ask when you need more direction or explanation. It is expected that you will spend approximately 10-12 hours per week on this course. Scheduling your time wisely and working efficiently will minimize the need for extra work in this course. Generally, I advise students to break this time up into blocks of 1-3 hours split over as many days of the week as possible given your schedule. Working on too much material in one sitting is more likely to cause frustration and does not allow for time for understanding to develop or for questions to be answered. Learn to use the materials to your greatest advantage. There is a lot of content, but if you understand the examples or if you have experience with certain topics, it may not be necessary to review all of the content we provide. The questions presented in the "Learn by Doing" and "Did I Get This" activities as well as the course worksheets are indicative of important questions and concepts that you will need to understand and are designed to teach as well as test your understanding. We highly encourage you to go through these as they are presented in the online textbook (for the "Learn by Doing" and "Did I Get This" activities) and the course E-learning page (for the worksheets). If you go through the content as directed, you will learn the skills you need to succeed in the course as well as build a foundation of statistical knowledge. If you ever feel lost, please ask, but also understand that the course is building to a complete picture, and it's sometimes hard to see how each topic is related until later in the semester when we tie everything together. Often, activities and worksheets are leading you to think about things that will be important later in the course while working on skills related to the current topic. Watch the software tutorials carefully, especially if you find the software aspect challenging, and review our suggestions in the SPSS information section. Do not allow yourself to waste time working in the software. If you are having issues, let us know immediately and we will help as soon as possible. Try to make sure as much of your time as possible in the software is productive. Be sure to ask when you don't understand, and stay on track with the material. Getting behind can be difficult to fix in any course, but especially an asynchronous one which is largely self-guided. Let the instructor know as soon as possible if you feel you are falling behind.

SUPPORT SERVICES

Accommodations for Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting https://disability.ufl.edu/students/get-started/ . It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: http://www.counseling.ufl.edu. On line and in person assistance is available.
- You Matter We Care website: http://www.umatter.ufl.edu/. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of

the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: https://shcc.ufl.edu/
- Crisis intervention is always available 24/7 from: Alachua County Crisis Center: 352-264-6789 http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx
- Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Inclusive Learning Environment
Public health and health professions are based on the belief in human dignity and on respect for the individual. As we share our personal beliefs inside or outside of the classroom, it is always with the understanding that we value and respect diversity of background, experience, and opinion, where every individual feels valued. We believe in, and promote, openness and tolerance of differences in ethnicity and culture, and we respect differing personal, spiritual, religious and political values. We further believe that celebrating such diversity enriches the quality of the educational experiences we provide our students and enhances our own personal and professional relationships. We embrace The University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office of Multicultural & Diversity Affairs website: www.multicultural.ufl.edu.

University of Florida
College of Public Health & Health Professions Syllabus

Content to Review	Tuesday	Thursday
Week 1	8/23	8/25
Unit 1A – EDA for One Variable		**Assignment 1 – Self-Assessment** **Quiz 1 – Syllabus Quiz**
Week 2	8/30	9/1
Unit 1B – EDA for Two Variables	**Quiz 2 – EDA for One Variable** **SAS Verification**	**Assignment 2A – EDA for One Variable (Software)**
Week 3	9/6	9/8
Unit 2 – Producing Data	**Quiz 3 – EDA for Two Variables**	**Assignment 2B – EDA for One Variable (Written)**
Week 4	9/13	9/15
Unit 3A – Probability	**Quiz 4 – Producing Data**	**Assignment 3A – EDA for Case CC and CQ (Software)**
Week 5	9/20	9/22
Unit 3B – Discrete Random Variables	**Quiz 5 – Probability**	**Assignment 3B – EDA for Case CC and Case CQ (Written)**
Week 6	9/27	9/29
Unit 3B – Continuous Random Variables	**Quiz 6 – Discrete Random Variables**	**Assignment 4 – Independent Events**
Week 7	10/4	10/6
Unit 3B – Sampling Distributions	**Quiz 7 – Continuous Random Variables**	**Assignment 5A – EDA for Two Variables (Software)**
Week 8	10/11	10/13
Unit 4A – Estimation	**Quiz 8 – Sampling Distributions**	**Course Project Step 1**

University of Florida
College of Public Health & Health Professions Syllabus

Content to Review	Tuesday	Thursday
Week 9	10/18	10/20
Unit 4A – Hypothesis Testing	**Quiz 9 – Estimation**	**Assignment 5B – EDA for Two Variables (Written)**
Week 10	10/25	10/27
Unit 4B – Inference for Relationships (Case CQ)	**Quiz 10 – Hypothesis Testing**	**Course Project Step 2**
Week 11	11/1	11/3
Unit 4B – Inference for Relationships (Case CQ)	**Quiz 11 – Case CQ Part I**	
Week 12	11/8	11/10
Unit 4B – Inference for Relationships (Case CC)	**Quiz 12 – Case CQ Part II**	**Course Project Step 3**
Week 13	11/15	11/17
Unit 4B – Inference for Relationships (Case QQ)	**Quiz 13 – Case QQ**	**Assignment 6 – Examples from Literature**
Week 14	11/22	11/24
Biostatistical Ethics	**Quiz 14 – Case CC**	**THANKSGIVING**
Week 15	11/29	12/1
Additional Topics in Regression	**Quiz 15 – Ethics**	**Assignment 7 – Inference with Data**
Week 16	12/6	12/8
Additional Topics in ANOVA		**Course Project Step 4** **Assignment 8 – End of Semester Self-Assessment**