

PHC6052 Introduction to Biostatistical Methods (3 credit hours)

Fall 2023

Delivery Format: On-campus

Course Materials and Assignments: <http://elearning.ufl.edu/>

Instructor: Dr. Jonathan Fischer
Class Meetings: **HPNP G307**
Mon 12:50-1:40 PM
Thu 1:55-3:50 PM
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Office Hours: Tue 1-3 PM & Wed 12-2 PM, or by appointment
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.
- **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	8/21-8/25	Unit 1A – EDA for One Variable
2	8/28-9/1	Unit 1B – EDA for Two Variables
3	9/4-9/8	Unit 2 – Producing Data
4	9/11-9/15	Unit 3A – Probability
5	9/18-9/22	Unit 3B – Discrete Random Variables
6	9/25-9/29	Unit 3B – Continuous Random Variables
7	10/2-10/6	Unit 3B – Sampling Distributions
8	10/9-10/13	Unit 4A – Estimation
9	10/16-10/20	Unit 4A – Hypothesis Testing
10	10/23-10/27	Unit 4B – Inference for Relationships (Case CQ)
11	10/30-11/3	Unit 4B – Inference for Relationships (Case CQ)
12	11/6-11/10	Unit 4B – Inference for Relationships (Case CC)
13	11/13-11/17	Unit 4B – Inference for Relationships (Case QQ)
14	11/20-11/24	Biostatistical Ethics & Happy Thanksgiving!
15	11/27-12/1	Additional Topics in Regression
16	12/4-12/8	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/or 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 two main 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 also has a free virtual app called SAS OnDemand for Academics. 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.

Option 2 will work for all users and operating systems and has the additional benefit of being free. It does require a few extra steps of file upload/download because it is hosted on a remote server, but we have tutorial videos demonstrating these steps.

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

For students who want to some additional interaction, we recommend participation 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)	40%
Software for Assignments (4)	15%
Software for Course Project (Steps 1, 2, 3)	15%
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

Attendance is strongly encouraged and will help you parse the significant amount of material in the course. Requirements for class attendance and make-up exams and assignments, and 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.

Recording within the Course

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, or exams), field trips, private conversations between students in the class, or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Policy Related to Guests Attending Class:

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are not permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please review the Classroom Guests of Students policy in its entirety.

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 SAS 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. 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	8/22	8/24
Unit 1A – EDA for One Variable		Assignment 1 – Self-Assessment Quiz 1 – Syllabus Quiz
Week 2	8/29	8/31
Unit 1B – EDA for Two Variables	Quiz 2 – EDA for One Variable SAS Verification	Assignment 2A – EDA for One Variable (Software)
Week 3	9/5	9/7
Unit 2 – Producing Data	Quiz 3 – EDA for Two Variables	Assignment 2B – EDA for One Variable (Written)
Week 4	9/12	9/14
Unit 3A – Probability	Quiz 4 – Producing Data	Assignment 3A – EDA for Case CC and CQ (Software)
Week 5	9/19	9/21
Unit 3B – Discrete Random Variables	Quiz 5 – Probability	Assignment 3B – EDA for Case CC and Case CQ (Written)
Week 6	9/26	9/28
Unit 3B – Continuous Random Variables	Quiz 6 – Discrete Random Variables	Assignment 4 – Independent Events
Week 7	10/3	10/5
Unit 3B – Sampling Distributions	Quiz 7 – Continuous Random Variables	Assignment 5A – EDA for Two Variables (Software)
Week 8	10/10	10/12
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	10/17	10/19
Unit 4A – Hypothesis Testing	Quiz 9 – Estimation	Assignment 5B – EDA for Two Variables (Written)
Week 10	10/24	10/25
Unit 4B – Inference for Relationships (Case CQ)	Quiz 10 – Hypothesis Testing	Course Project Step 2
Week 11	10/31	11/2
Unit 4B – Inference for Relationships (Case CQ)	Quiz 11 – Case CQ Part I	
Week 12	11/7	11/9
Unit 4B – Inference for Relationships (Case CC)	Quiz 12 – Case CQ Part II	Course Project Step 3
Week 13	11/14	11/16
Unit 4B – Inference for Relationships (Case QQ)	Quiz 13 – Case QQ	Assignment 6 – Examples from Literature
Week 14	11/21	11/23
Biostatistical Ethics	Quiz 14 – Case CC	THANKSGIVING
Week 15	11/28	11/30
Additional Topics in Regression	Quiz 15 – Ethics	Assignment 7 – Inference with Data
Week 16	12/5	12/7
Additional Topics in ANOVA		
Exam week	12/12	12/14
	Course Project Step 4 Assignment 8 – End of Semester Self-Assessment	