

Milken Institute School of Public Health

THE GEORGE WASHINGTON UNIVERSITY

Department of Epidemiology and Biostatistics
Biostatistical Applications in Public Health
PubH 6002.10 — Fall 2016

3 credits

Wednesdays 6:10–9:00 pm in Room SPH 100

Instructor

Naji Younes, PhD
Associate Professor
Department of Epidemiology and Biostatistics

Email: naji@gwu.edu

Office Hours: by appointment

Location: Science and Engineering Hall (SEH), Room 7680

Tel: 202-994-4501

Teaching Assistants and Teams

The class will be divided up in 7 teams, each with a teaching assistant (more below). The teams are as follows. Note that we don't have the breakout rooms and TA assignments at this time. An updated syllabus will be posted as soon as we have them.

Team	Room	Leader	eMail
1	100	Abbey Woolverton	awoolverton@gwmail.gwu.edu
2	200A	CJ Stratton	cjstratton@email.gwu.edu
3	300C	Hala Nsouli	Hnsouli@gwu.edu
4	500A	Hamid Ferdosi	hamidferdosi@gwu.edu
5	500C	Kathleen Hamill	kathleen_hamill@gwmail.gwu.edu
6	400B	Morgan Byrne	byrne410@gwu.edu
7	200B	Rachael Crockett	rachaelmcrockett@gmail.com
8	300B	Hannah Yellin	hlyellin@gmail.com

Course Description

PubH6002 is an introductory course in biostatistical techniques in Public Health. This section, section 10, will focus on data exploration, analysis and visualization using the R statistical software. The lectures and labs include a substantial amount of hands-on data exploration and analysis using R. The class assumes no prior knowledge of R or of statistical software – these will be covered as part of the lectures.

Program Competencies

Students successfully completing this course will be able to:

1. Explore datasets to discover interesting features and anomalies
2. Select and use appropriate biostatistical methods to explore relationships between variables
3. Assess the limitations of these methods and interpret their results
4. Convey the results of the analysis effectively using graphics

5. Create reproducible, self-documenting data analyses

Course Learning Objectives

	Meets Competency
• Use R and RStudio effectively	#1-5
• Use graphics and biostatistical techniques to explore data	#1
• Select appropriate biostatistical techniques to analyze data	#2
• Assess the fit of various techniques, fix problems	#3
• Interpret the results of analyses, understand the limitations	#3
• Prepare clear and effective graphics to communicate the results with a variety of audiences	#4
• Organize analyses in Markdown documents	#5

Recommended/Supplemental Texts

There are no required texts for this class. The book “Intuitive Biostatistics: A Nonmathematical Guide to Statistical Thinking, 3rd edition” by Harvey Motulsky is a recommended, non-technical complement to the class. If you are looking for a more technical text, Bernard Rosner “Fundamentals of Biostatistics” 7th ed. Is a good option.

Methods of Instruction (check all that apply)

<input checked="" type="checkbox"/> Lectures	<input checked="" type="checkbox"/> Class and Small Group Discussions
<input type="checkbox"/> Case Studies	<input type="checkbox"/> Student Presentations
<input type="checkbox"/> Required Readings/Textbook	<input checked="" type="checkbox"/> Other [Online experiments]
<input type="checkbox"/> Recommended/Supplemental Readings	

Class Structure and Information

General Information

The class will be held from 6:10PM to 9:10PM on Wednesdays and will normally be divided into a lecture from 6:10PM to 8:00PM followed by a lab from 8:15PM until 9:00PM.

Classes will be held in SPH 100, the large auditorium immediately on your right when you enter the SPH building. Don't forget to bring your GW ID card since you'll need it to enter the building.

The primary purpose of the lab is to give you an opportunity to ask questions (since this is difficult during the lecture because of the class size) and to practice the lecture material.

Three of the classes will include in-class quizzes. On those days, the quiz will be done first, and the lecture will occupy the remainder of the time, so there will be no lab (see below for details about the quizzes)

Lectures will start on time. Please remember to set your cell phone to vibrate mode¹.

Bring your laptop!

You are **strongly** encouraged to install R and RStudio on your laptop or portable device, and bring it to class and to the labs. The instructions for installing R and RStudio are on BlackBoard.

¹ Unless you have a really cool ringtone, but then only once, please.

The main lecture room (SPH 100) has very few electrical outlets, mostly located in the front of the room, so you may want to make sure your laptop has enough charge to get through the lecture. The lab rooms will have plenty of outlets.

On days where there is an in-class exam, bring your laptop for the lecture, but the exam itself will not require you to use your laptop. You will not need your laptop for the final either.

Lab Teams

All students will be assigned to one of 8 lab groups. Each of these lab groups will be under the direction of a Team Leader. The names and email addresses of the Team Leaders will be listed at the beginning of the syllabus. A document with the student membership in each team, classroom location and Team leader is on Blackboard. Teams are carefully balanced so that each is as representative of the whole class as possible, so *your team assignment is final and can't be changed*. Scheduled lab sessions will start at 8:15PM immediately following the lecture and will have duration of sixty minutes, until 9:00PM.

In each lab session, the Team Leader will distribute a non-graded in-class exercise covering the material presented in class. This exercise will be solved by the group during the lab time with the Team Leader moderating the discussion and answering any student questions.

Understanding the solutions to the in-class exercises will prepare you for a successful performance on the graded quizzes and final exam. We strongly encourage team work during the labs as we've found it to be very beneficial.

You must attend at least 8 of the 10 scheduled laboratory sessions and complete the in-class exercises in order to receive full 10% credit of the lab grade. Attendance to lab will be recorded each week. If you need to miss a lab, please coordinate with your team leader.

Questions Outside of Labs

You will get a chance to interact with your team leader during labs. For questions that arise outside of labs, the preferred mechanism for questions is email. This has worked well in the past and team leaders are prompt in replying.

Questions about R

Working with statistical software in general inevitably involves some frustration. Although R is simpler than most, you will get stuck especially when you first start. Things that look clear in class can look considerably less so when you're working on your own. It gets easier, but you will probably find yourself struggling with errors and scratching your head over unexpected results: this is all a healthy part of getting comfortable with the language – but only up to a point. This is biostatistics class and we don't want you to struggle endlessly with R. If you are stuck and don't feel like you're making progress, contact your team leader or your instructor!

Take home quizzes

There are 3 take-home quizzes. You will have one week to complete each of them. A late submission for a take-home quiz will earn the grade of 0. Solutions will be posted on Blackboard. In class quizzes (below) will be very similar to take home ones.

In class quizzes

There will be 3 in-class graded. In-class quizzes will be administered at the beginning of the lecture period. You will have 35 minutes to complete the in-class quiz. Please plan to arrive for class on time, especially on quiz days! A no-show to an in-class quiz would earn the grade of 0 for that assessment. All in-class quizzes are closed book and closed notes. On the in-class quiz days, lectures will be held from 6:50pm to 8:50pm and there will be no lab those days.

Make-up quizzes will only be given under exceptional circumstances, and must be approved at least a week in advance.

Review session

There is a review session scheduled for the last lecture on December 7. Additional review sessions may be scheduled depending on Team Leader and classroom availability.

Final Exam

The final exam has been scheduled on Wednesday, **December 14** starting at 6:00 pm in SPH 100. Further information about the final exam will be given later on the semester.

Blackboard

Blackboard will be used for posting course files and assignments and for communicating with the class. You are already “signed up” for this course on Blackboard, since it is linked to the course registration system. It is your responsibility to periodically check the course site (log in at <http://blackboard.gwu.edu/> Using your gwu.edu address) for updates to the syllabus and readings.

Methods of Evaluation

There are 3 take-home and 3 in-class quizzes are worth 10% each. The worst of these 6 grades will be automatically dropped, so the quizzes account for 50% of the grade. The team experiment assigned in lecture 12 is worth 15 points (more details as we get closer). Lab attendance is worth 15 points. The final is worth 20 points.

Grading Scale and Standards

Assignments will be evaluated on the content and clarity of the response. At the completion of the semester, grades will be based on the following:

A	90.0 – 100
B	80.0 – 89.0
C	70.0 – 79.0
F	< 69.0

Religious Holidays

We respect an individual's observance of religious holidays, and will accommodate requests to reschedule assignment due dates and examination dates if they conflict with religious holidays. Please notify one of the instructors in writing (by email) during the first week of the semester of your need for a religious holiday accommodation.

Blackboard

Blackboard will be used for posting course files and assignments and for communicating with the class. You are already enrolled for this course on Blackboard if you have completed registration for the course. It is your responsibility to periodically check the course site (log in at <http://blackboard.gwu.edu/> Using your gwu.edu address) for updates to the syllabus/readings.

Academic Integrity

All Milken Institute School of Public Health Students are required to complete two (separate) online activities regarding academic integrity -- the GW Academic Integrity Activity and the Identifying and Avoiding Plagiarism Activity. Both activities must be completed within 2 weeks

of starting your coursework at Milken Institute School of Public Health. - See more at:
<https://publichealth.gwu.edu/integrity#sthash.FII RdO5H.dpuf>

Please review the University's policy on academic integrity, located at www.gwu.edu/~integrity/code.html and complete the online training for all GWSPH students; All graded work must be completed in accordance with the George Washington University Code of Academic Integrity.

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. Common examples of academically dishonest behavior include, but are not limited to, the following: cheating; fabrication; plagiarism; falsification and forgery of University academic documents; facilitating academic dishonesty.

Students with Disabilities

If you feel you may need an accommodation based on the impact of a disability, please contact your instructor privately to discuss specific needs. Please contact the Disability Support Services Office at 202.994.8250, <http://gwired.gwu.edu/dss>, to establish eligibility and to coordinate reasonable accommodations

Adverse Weather/Class Cancellation

In the advent of inclement weather or any other emergency, the Milken Institute School of Public Health will follow the decision of the University. Call the University hotline at 202.994.5050 or check the Human Resources status button at <http://hr.gwu.edu/adverse-weather-conditions-and-emergency-situations>. In the event of class cancellation, we will email you about rescheduling, assignments due, etc.

Personal Support

Counseling Center: The GW University Counseling Center offers a wide variety of counseling services to students including individual counseling, group counseling, academic support, career counseling, referral information, and alcohol/drug services. The Counseling Center is available to both undergraduate and graduate students. For more information: 2033 K Street, NW, #330, 202-994-5330, <http://gwired.gwu.edu/counsel/>. Information on other available resources is available on the GW website and in the SPH Student Handbook <http://publichealth.gwu.edu/services/students>.

Emergency Preparedness

Emergency Numbers

Foggy Bottom (GWPD)	202-994-6111
Mount Vernon (GWPD)	202-242-6111
VSTC (Loudoun County)	911
Other Locations	911

Non-Emergency Numbers

Foggy Bottom (GWPD)	202-994-6110
Mount Vernon (GWPD)	202-242-6110
GW Information Line	202-994-5050
VSTC Information Line	571-553-8333

In Case of Fire

- ☐ Pull the fire alarm
- ☐ Leave the building immediately using the closest emergency exit, closing doors behind you
- ☐ Call GWPD (202-994-6111) or 911 when safe to do so
- ☐ Assemble in a designated area
- ☐ Re-enter the building only when instructed by emergency officials

- Do not assume an alarm is false
- USE STAIRS, do not use elevators
- If unable to exit the building, go to the nearest exit stairwell or safe area of refuge and call GWPd (202-994-6111) or 911 to report your location
- If trained, use a fire extinguisher if the fire is small and contained and the room is not filled with smoke

Emergency exits located at the north and south stairwell, on the ground floor (same floor as the class)

Primary meeting area GW Hospital plaza

Severe Weather

Thunderstorms are the most common type of severe weather in the Washington, DC metropolitan area. However, winter storms, extreme hot/cold temperatures, flooding, tornadoes and hurricanes can occur. Check CampusAdvisories.gwu.edu for up-to-date weather advisories and information.

Shelter-in-place for severe weather events:

- ☐ Seek shelter indoors in a low part of the building
- ☐ Move to a windowless interior room away from hazardous materials
- ☐ Take cover under a sturdy object or against an interior wall
- ☐ Monitor Campus Advisories and local media
- ☐ Wait for the all clear before leaving your safe space

Violence/Active Shooter

If an active shooter is in your vicinity, call GWPd (202-994-6111) or 911 when it is safe to do so and provide information, including the location and number of shooter(s), description of shooter(s), weapons used and number of potential victims.

Evacuate: If there is an accessible escape path, attempt to evacuate the premises

- Have an escape route and plan in mind; leave your belongings behind; follow instructions of police officers

Hide Out: If evacuation is not possible, find a place to hide where the active shooter is less likely to find you

- Hide in an area out of the shooter's view; provide protection; lock the doors; block entry to your hiding place; silence your phone; wait for law enforcement

Take Action: As a last resort and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the shooter by:

- Acting as aggressively as possible against him/her; yelling; throwing items and improvising weapons; and commit to your actions

Emergency Communications

CampusAdvisories.gwu.edu is the university's primary website used for communicating emergency preparedness and incident-related information (including class cancellations) to the GW community.

GW Alert is a notification system that sends emergency alerts to email addresses and mobile devices. Students, faculty and staff are requested to maintain current contact information and campus location information by logging into the GWeb Information System (banweb.gwu.edu). In emergency situations, alerts may also appear at the top of university webpages.

Media Outlets, such as 103.5FM or WTOP, may be contact with emergency information, such as weather-related delays and closing

Lecture Topics

The topics covered in the lectures are summarized below:

Lecture 1: Exploratory data analysis with R An introduction to R, RStudio and basic exploratory data analysis	August 31
Lecture 2: Continuous variables Summary statistics for continuous variables, graphical methods and their interpretation	September 7
Lecture 3: Discrete variables Summary statistics for ordinal and categorical variables, graphical methods and their interpretation	September 14
Lecture 4: Common data problems Distributional anomalies; missing values; imputation; influential observations; conceptual issues	September 21
Lecture 5: Extrapolating from Samples Probability; Confidence intervals; group comparisons using confidence intervals; hypothesis testing; p-values	September 28
Lecture 6: Measuring association Measures of association for binary and categorical variables; correlation measures; measures of concordance	October 5
Lecture 7: Single predictor models Least squares; Analysis of variance, of covariance; interpretation; model fit	October 12
Lecture 8: Multiple predictor models Model selection; interpretation of coefficients; interactions	October 19
Lecture 9: Modeling repeated measures Longitudinal data; random effects models; GEE; introduction to censoring	October 26
Lecture 10: Modeling probabilities and rates Logistic regression, Poisson regression	November 2
Lecture 11: Modeling time to event Event-time analysis; Kaplan-Meier curves; proportional hazards model	November 9
Lecture 12: Design of experiments Principles of experimental design; stratification, clustering, randomization; bias control	November 16
Lecture 13: Inference Issues Experiment design; Multiple comparisons, false discovery rate	November 30
Lecture 14: Review Session Review for the final exam.	December 7
Lecture 15: Final Exam More details as we get closer	December 14

Course Flow

The chart below shows the lecture titles on the left and the labs and assignments for each lecture on the right.

