BIOST 2041: Introduction to Statistical Methods (Class location: G23 Public Health)

Graduate School of Public Heath
Fall 2021

Instructional Team

Primary Instructor	Email	Office Hours
Ada Youk, PhD	ayouk@pitt.edu or send message via Canvas	by appointment (email for availability)
Jenna Carlson, PhD*	jnc35@pitt.edu	

*Dr. Carlson will be on leave beginning in the middle of the semester – contact Dr. Youk for all course related matters

Teaching Assistants	Email	Office Hours
Maggie Kuzemchak (part-time)	mck76@pitt.edu	Tuesdays 11:30 am – 12:30 pm *
Jenna Li	jel180@pitt.edu	Thursdays 12 – 1 pm (Zoom) Thursdays 1 – 2 pm (in-person)
Brian O'Connell	brr99@pitt.edu	Wednesdays 11 am – 1 pm *
Nina Oryshkewych (part-time)	nso6@pitt.edu	Thursdays 4 – 5 pm *
Henry Thorpe	het29@pitt.edu	Tuesdays 10 – 11 am * Tuesdays 4 – 5 pm (Zoom)

* These office hours will be via Zoom until September 12th, then will be in-person beginning September 13th. All in-person office hours will be held in **A443 Public Health** (4th floor, the "old" side of the building, turn right from the main set of elevators and keep going)

Course Delivery Model

This class will primarily be in-person, except for a remote option for the first 2 weeks of class (through Sunday, September 12th). The situation is constantly evolving, and we may change plans in the future. Thanks for your patience and flexibility as we try to provide the best and safest possible learning environment for all.

Course Meeting Times

Section 1030: Mondays, 4:00 – 5:25 pm
Section 1040: Wednesdays, 4:00 – 5:25 pm
Each student should attend the course meeting time for the section they are enrolled in only. Note: class sessions will end by 5:25pm each day – we will not use the entire allotted time. These class sessions will be hands-on practice with example problems with feedback from the instructor and TAs. They are designed for active participation, not observation. Learning statistics is like learning a new language – it is done over time and with lots of practice! Please review the assigned videos and materials *prior* to attending class and be prepared to actively engage with the course material during class time. Reviewing course notes will *not* be sufficient to learn the material for this course. Thus, your participation in this class is strongly encouraged.

Textbooks

The course materials distributed through Canvas will be sufficient. However, if you prefer to have a reference text, this course follows the notation of:

- *Biostatistics for the Biological and Health Sciences, 2nd edition* (ISBN: 978-0-13-403901-5)

For extra help with analysis software consider reviewing:

- *Data Analysis with Stata* (ISBN: 978-1-78217-317-5)
- *Biostatistics with R* (ISBN: 978-1-4614-1301-1)

These texts can be read online for free through the University of Pittsburgh library (library.pitt.edu)

Software

Students will be permitted to work with either Stata or R in the course. All instruction will be provided for Stata. A set of limited notes will be additionally provided for students who are already familiar with R or who want to learn R independently. It is strongly encouraged that students work exclusively in one software for the semester. For students with no prior programing experience, Stata is strongly recommended.

Stata

Download Stata through the Software Download Service (software.pitt.edu)

R and RStudio

Download R and then RStudio

Course Website (Canvas)

Course materials will be distributed and turned in through course website (canvas.pitt.edu), which you can access by logging in with your Pitt user ID and password. Any announcements will be distribution through Canvas, so please make sure to update your notification preferences. If you need help logging in to Canvas, call the University Help Desk at 412-624-HELP [4357]. If you experience any issues using Canvas, you can click the Help button within Canvas, which includes 24/7 chat or telephone support. You may also find the following resources helpful in navigating Canvas:

Canvas Getting Started Guide
Canvas Student Tour Videos

Course Prerequisites, Description, and Goals

BIOST 2041 is an introductory applied biostatistics course for public health students and health career professionals who will make use of statistical methods in research projects or in interpreting literature. This class is for students needing a more research-oriented approach than that provided in BIOST 2011 (Principles of Statistical Reasoning). The prerequisite is college-level algebra.

The overall purpose of this course is to introduce students to basic probability and one and two sample procedures (point and interval estimation and hypothesis testing) for continuous and discrete distributions. Basic one and two sample nonparametric tests are also presented. An introduction to simple linear regression and one and two-way ANOVA are also included. This broad goal includes use of statistical software to analyze data sets and answer research questions; recognition of situations when these procedures are and are not appropriate; and intuitive understanding of the rationale used in creating the statistical procedures presented.

Course Learning Objectives

At the conclusion of this course, a student should be able to:

1. Select quantitative data collection methods appropriate for a given public health context.
2. Describe basic concepts of probability, random variation, and commonly used statistical probability distributions.
3. Describe preferred methodological alternatives to commonly used statistical procedures when assumptions are not met.
4. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
5. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate. To include:
    A. Apply descriptive techniques commonly used to summarize public health data.
    B. Apply common statistical methods for inference.
    C. Apply basic regression methodology.
    D. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.

6. Interpret results of data analysis for public health research, policy or practice.

Course Competencies

CEPH MPH Competencies

#2. Select quantitative 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.

CEPH DrPH Competencies

#1. Explain quantitative methods and policy analysis research and evaluation methods to address health issues at multiple (individual, group, organization, community and population) levels

Course Organization

The material for this course has been broken down into 10 modules, each with a dedicated topic and set of assessments. You can find a brief description of each module here:

Module #	Description	Assignments	Course Objectives	CEPH Competencies
M0	Course structure and organization	Quiz		
M1	Basic principles	Quiz	1, 6	MPH 2,4, DrPH 1
M2	Descriptive statistics	Quiz, DA	5A, 6	MPH 2,3
M3	Probability	Quiz	2, 5A, 6	MPH 3
M4	One-sample proportions and means	Quiz, DA	1, 4, 5B, 5D, 6	MPH 2,3,4, DrPH 1
M5	Contingency tables	Quiz, DA	1, 3, 4, 5B, 5D, 6	MPH 2,3,4, DrPH 1
M6	Two-sample means	Quiz, DA	1, 4, 5B, 5D, 6	MPH 2,3,4, DrPH 1
M7	Nonparametrics	Quiz, DA	1, 3, 4, 5B, 5D, 6	MPH 2,3,4, DrPH 1
M8	One- and two-way ANOVA	Quiz, DA	1, 4, 5B, 5D, 6	MPH 2,3,4, DrPH 1
M9	Linear regression	Quiz, DA	1, 4, 5B, 5C, 5D, 6	MPH 2,3,4, DrPH 1
M10	Putting it all together	Quiz, DA	1, 3, 4, 5A, 5B, 5C, 5D, 6	MPH 2,3,4, DrPH 1

Student Performance Evaluation

Students will be evaluated based on their performance in the following assessments. All assessments will be graded on a complete/incomplete basis.

Grading Scale

The grade system of this course is designed to reflect each student's mastery of the learning objectives. There are a total of 8 data analysis (DA) assignments and 11 quizzes. Thus, students will be graded using the following terms:

Final Grade	What you need to do to earn it
F	Fail to meet the requirements for a D
D	Complete at least 3 DAs and 2 quizzes within 3 attempts*
D+	Complete at least 3 DAs and 3 quizzes within 3 attempts*
C-	Complete at least 4 DAs and 4 quizzes within 3 attempts*
C	Complete at least 4 DAs and 5 quizzes within 3 attempts*
C+	Complete at least 5 DAs and 6 quizzes within 3 attempts*
B-	Complete at least 5 DAs and 7 quizzes within 3 attempts*
B	Complete at least 6 DAs and 8 quizzes within 3 attempts*
B+	Complete at least 6 DAs and 9 quizzes within 3 attempts*

A-	Complete at least 7 DAs and 10 quizzes within 3 attempts*
A	Complete all 8 DAs and 11 quizzes within 3 attempts*
A+	Complete all 8 DAs and 11 quizzes on the first attempt (no revisions or corrections needed)

* within 3 attempts means you are allowed to revise/correct each DA/quiz up to 2 times within 14 days after the due date

Quizzes

Quizzes should be taken in Canvas by 11:59pm on the due date. Quizzes are open note, open internet, but you must work independently. You are forbidden from working with any other person on quizzes. Quizzes will be multiple choice questions, will cover material presented in the respective module, and will have an emphasis on conceptual questions. To complete a quiz, a student must earn a score of 80% or better.

If you do not complete the quiz on the first attempt (i.e., your score is <80%), you can write quiz corrections to earn a "complete" for the quiz. To correct a quiz, write the correct answer for each missed question and include a detailed explanation to support the correct answer (i.e., why is that answer correct?). You can submit quiz corrections using a separate assignment link in Canvas (not the original quiz link) that will become available after the quiz due date. Students are permitted to confer with classmates on quiz corrections, as long as the work they submit is entirely their own, and are welcome to ask questions about them during TA or instructor office hours. Submitting a quiz correction does not guarantee a complete; submissions will be evaluated to ensure that the student has demonstrated sufficient understanding of the material to warrant a complete.

These quizzes cannot be taken late without a compelling reason and supporting documentation. Contact Dr. Youk for help with this. Students with disability accommodations are encouraged to work with the Testing Center to schedule quizzes (http://www.studentaffairs.pitt.edu/drs/).

Data Analysis Assignments (DA)

For a data analysis assignment, you must select the appropriate statistical method to use and perform analysis in Stata or R. These assignments will be graded for both accuracy and completion using the data analysis assignment rubric (available in Canvas). Data analysis assignments are to be submitted through Canvas prior to 11:59pm on the corresponding due date. Students are permitted to work with classmates on data analysis assignments, as long as the work they submit is entirely their own. To complete a data analysis assignment, a student must earn "meets expectation" or "exceeds expectations" for each criterion on the supplied rubric (available at the end of this document).

Students not completing a DA assignment can revise the assignment. Assignment revisions must be submitted within 14 days of the original due date and should be submitted using the same Canvas link as the original assignment. Students are permitted to confer with classmates on assignment revisions, as long as the work they submit is entirely their own, and are welcome to ask questions about them during TA or instructor office hours. Submitting a revision for an assignment does not guarantee a complete; revisions will be evaluated using the same rubric to ensure that the student has demonstrated sufficient understanding of the material to warrant a pass.

Working Outside of the Schedule

Module materials including assignments will be posted incrementally to pace your work throughout the semester, so you may be able to work ahead if you need to. Sometimes, I mistakenly forgot to "publish" something on the Canvas page to make it visible to you, so if you think you should have access to something that isn't available, please send me a message.

If something comes up (e.g., you fall ill or need to care for someone in your household who is ill), please message Dr. Youk through Canvas ASAP. We will work out a way to get you missed course materials and can work out a timeframe for completing the coursework based on your specific situation. I try my best to be accommodating, but please do not take advantage of this. Working outside the preset course schedule creates extra work for me and the TAs and limits our

availability to other students. Also, please note that I do not consider planned trips (vacations, conferences, etc.) to justify accommodations in the assignment due dates.

Late work policy

Late work is NOT accepted without prior approval (before the due date) from Dr. Youk. Extensions on assignment deadlines may be granted for unforeseen, extenuating circumstances (family emergencies, severe illness, etc.).

Grading concerns

Students have 24 hours after graded work is returned to request a regrade. These requests must be sent via Canvas message to Dr. Youk and include an explanation for why the regrade is necessary. Please note: a regrade means the entire assessment will be graded again which may result in a lower grade.

Accommodation for Students with Disabilities

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, 412-648-7890 as early as possible in the term

Academic Integrity Statement

All students are expected to adhere to the school's standards of academic honesty. Cheating/plagiarism will not be tolerated. The Graduate School of Public Health's policy on academic integrity, which is based on the University policy, is available online in the Pitt Public Health Academic Handbook www.publichealth.pitt.edu/home/academics/academic-requirements. The policy includes obligations for faculty and students, procedures for adjudicating violations, and other critical information. Please take the time to read this policy.

Sexual Misconduct, Required Reporting and Title IX Statement

The University is committed to combatting sexual misconduct. As a result, you should know that University faculty and staff members are required to report any instances of sexual misconduct, including harassment and sexual violence, to the University's Title IX office so that the victim may be provided appropriate resources and support options. What this means is that as your professor, I am required to report any incidents of sexual misconduct that are directly reported to me, or of which I am somehow made aware.

There are two important exceptions to this requirement about which you should be aware:

A list of the designated University employees who, as counselors and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: https://www.diversity.pitt.edu/civil-rights-title-ix/make-report/report-form

An important exception to the reporting requirement exists for academic work. Disclosures about sexual misconduct that are shared as part of an academic project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX office.

If you are the victim of sexual misconduct, Pitt encourages you to reach out to these resources:

Title IX Office: 412-648-7860
SHARE @ the University Counseling Center: 412-648-7930 (8:30 A.M. TO 5 P.M. M-F) and 412-648-7856 (AFTER BUSINESS HOURS)

If you have a safety concern, please contact the University of Pittsburgh Police, 412-624-2121.

Other reporting information is available here: https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/make-report

Diversity Statement

Pitt Public Health Diversity Statement | Effective Academic Year 2021-22

The University of Pittsburgh Graduate School of Public Health considers the diversity of its students, faculty, and staff to be a strength and critical to its educational mission. Pitt Public Health is committed to creating and fostering inclusive learning environments that value human dignity and equity and promote social justice. Every member of our community is expected to be respectful of the individual perspectives, experiences, behaviors, worldviews, and backgrounds of others. While intellectual disagreement may be constructive, no derogatory statements, or demeaning or discriminatory behavior will be permitted.

If you feel uncomfortable or would like to discuss a situation, please contact any of the following:
the course director or course instructor;

- the Pitt Public Health Associate Dean responsible for diversity and inclusion;
- the University's Office of Diversity and Inclusion at 412-648-7860 or
- https://www.diversity.pitt.edu/civil-rights-title-ix/make-report/report-form (anonymous reporting form)

Copyright Notice

Course material may be protected by copyright. United States copyright law, 14 USC section 101, et sec., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See Library of Congress Copyright Office and the University Copyright Policy.

Health and Safety Statement

During this pandemic, it is extremely important that you abide by the public health regulations , the University of Pittsburgh's health standards and guidelines, and Pitt's Health Rules. These rules have been developed to protect the health and safety of all of us. Universal face covering is required in all classrooms and in every building on campus, without exceptions, regardless of vaccination status. This means you must wear a face covering that properly covers your nose and mouth when you are in the classroom. If you do not comply, you will be asked to leave class. It is your responsibility have the required face covering when entering a university building or classroom. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

If you are required to isolate or quarantine, become sick, or are unable to come to class, contact Dr. Youk as soon as possible to discuss arrangements.

Data Analysis Assignment Rubric

Criteria	**Ratings**		
Criterion 1: Methods	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Clear and appropriate use of statistical methods to address research question, choice of method is justified, description of methods is clear and accurate	Mostly appropriate use of statistical methods to address research question, description of methods is clear and accurate with minor exceptions	Inappropriate use of statistical methods to address research question and/or description of methods is unclear or inaccurate
Criterion 2: Use of statistical software	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Analyses conducted in Stata/R match described methods, output is formatted in a way that is easy to read	Analyses conducted in Stata/R match described methods with minor exception, Stata/R output is formatted in a way that readable but not ideal	Analyses conducted in Stata/R do not match described methods, output is incomplete or unreadable
Criterion 3: Tables and graphics	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Tables and graphics contribute greatly to the results, are clear to read and understand, are labeled with appropriate titles and labels and are visually appealing	Tables and graphics clearly convey results and are clear to read and understand	Tables and graphics are missing or do not add to the results and/or are unclear
Criterion 4: Results	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Relevant descriptive statistics and effect estimates are reported; results are consistent with methods and use of statistical software; a clear summary of results is provided	Relevant descriptive statistics and effect estimates are reported with minor exceptions; results are consistent with methods and use of statistical software with minor exceptions	Minimal results are reported; may be inconsistent with methods and/or use of statistical software
Criterion 5: Conclusions	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Conclusions are consistent with the results, are worded in the context of problem, all statistical terms used are explained in context	Conclusions are consistent with the results, minimal context is missing, statistical terms are sometimes used without explanation	Conclusions are sometimes inconsistent with the results, some context is missing, statistical terms are used without explanation
Criterion 6: Organization and style	**Exceeds Expectations**	**Meets Expectations**	**Needs Improvement**
	Assignment is easy to read and follow, content is well organized, writing is effective and coherent	Assignment is easy to read and follow with some minor exceptions, content is organized, writing is somewhat effective but has some mistakes	Layout of document is confusing at times and/or writing is sometimes unclear

Course Calendar

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	8/30	8/31	9/1	9/2	9/3
	Class: M0/M1 (1030)	M0 Quiz (1030)	Class: M0/M1 (1040)	M0 Quiz (1040)	
2	9/6	9/7	9/8	9/9	9/10
	Labor Day (no class)	M1 Quiz (1030)	no class	M1 Quiz (1040)	add/drop deadline
3	9/13	9/14	9/15	9/16	9/17
	Class: M2 (1030)		Class: M2 (1040)		
4	9/20	9/21	9/22	9/23	9/24
	Class: M3 (1030)	M2 Quiz (1030) M2 DA (1030)	Class: M3 (1040)	M2 Quiz (1040) M2 DA (1040)	
5	9/27	9/28	9/29	9/30	10/1
	Class: M4 (1030)	M3 Quiz (1030)	Class: M4 (1040)	M3 Quiz (1040)	
6	10/4	10/5	10/6	10/7	10/8
	Class: M4 (1030)		Class: M4 (1040)		
7	10/11	10/12	10/13	10/14	10/15
	Class: M5 (1030)	M4 Quiz (1030) M4 DA (1030)	Class: M5 (1040)	M4 Quiz (1040) M4 DA (1040)	Fall Break (no classes)
8	10/18	10/19	10/20	10/21	10/22
	Class: M6 (1030)	M5 Quiz (1030) M5 DA (1030) Withdrawal deadline	Class: M6 (1040)	M5 Quiz (1040) M5 DA (1040)	
9	10/25	10/26	10/27	10/28	10/29
	Class: M6 (1030)		Class: M6 (1040)		
10	11/1	11/2	11/3	11/4	11/5
	Class: M7 (1030)	M6 Quiz (1030) M6 DA (1030)	Class: M7 (1040)	M6 Quiz (1040) M6 DA (1040)	
11	11/8	11/9	11/10	11/11	11/12
	Class: M8 (1030)	M7 Quiz (1030) M7 DA (1030)	Class: M8 (1040)	M7 Quiz (1040) M7 DA (1040)	
12	11/15	11/16	11/17	11/18	11/19
	Class: M8 (1030)		Class: M8 (1040)		
13	11/22	11/23	11/24	11/25	11/26
	Thanksgiving Break (no classes)				
14	11/29	11/30	12/1	12/2	12/3
	Class: M9 (1030)	M8 Quiz (1030) M8 DA (1030)	Class: M9 (1040)	M8 Quiz (1040) M8 DA (1040)	
15	12/6	12/7	12/8	12/9	12/10
	no class (review M10 on your own)	M9 Quiz (1030) M9 DA (1030)	no class (review M10 on your own)	M9 Quiz (1040) M9 DA (1040)	
16	12/13	12/14	12/15	12/16	12/17
	no class	M10 Quiz (1030) M10 DA (1030)	no class	M10 Quiz (1040) M10 DA (1040)	Last day to submit any coursework

All revisions/corrections must be completed within 2 weeks of assignment due date (or the end of term if that comes sooner)