

BIOST 2011: Principles of Statistical Reasoning

Days and time: Mondays & Wednesdays 4:00 – 5:15 pm

Location: A115 Public Health

Instructor

Shyamal Peddada

Email

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Office Location & Hours

7126 Public Health
M/W from 2:45pm to 3:45pm

Teaching Assistants

Mr. Greg Procaro

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A443 Public Health
Tu/Th from 1:00pm to 2:00pm

Mr. Ruishen Lyu

RUL40@pitt.edu

A443 Public Health
Tu/Th from 12:00pm to 1:00pm

Recommended Textbooks

- *Biostatistics for the Biological and Health Sciences, 2nd edition* (ISBN: 978-0-13-403901-5)
- *Data Analysis with Stata* (ISBN: 978-1-78217-317-5) (This text can be read online through the University of Pittsburgh library library.pitt.edu)

Software

Stata (version 15.0 SE)

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

Equipment

You will be allowed the use of a calculator for in-class exams. This cannot be your cell phone or computer. It is strongly recommended to use the same calculator for homework as you will on the exams.

Recitation

Mondays 5:20 – 5:55 pm

Recitation will consist of guided work through additional practice problems (to be turned in prior to the next class period). During recitation, you will also have the opportunity to ask questions, get clarification on material presented in class, go over past assignments, and prepare for exams. Although not required, it may be helpful to bring a laptop/tablet to recitation.

Course Website

Course materials will be distributed and turned in through CourseWeb (courseweb.pitt.edu).

When submitting assignments, please first convert your assignment document to a PDF file, and

then submit the assignment through the CourseWeb assignment tab using Chrome, Firefox, or Safari (for help see: www.etskb-stu.cidde.pitt.edu/blackboard/submit-assignments/).

Additionally, the CourseWeb announcement mechanism will be used to send messages about class. Only in the event of a time-dependent event (e.g., class canceled due to weather), will an email be sent out to the class. Course-related email will be sent to your "pitt.edu" address only.

Grading Scale

Course grades will be assigned based on the following scale.

A+: [97%, 100%), A: [93%, 97%), A-: [90%, 93%)
B+: [87%, 90%), B: [83%, 87%), B-: [80%, 83%)
C+: [77%, 80%), C: [73%, 77%), C-: [70%, 73%)
D+: [67%, 70%), D: [63%, 67%), D-: [60%, 63%)
F: [0, 60%)

Student Performance Evaluation

Course grades are based on your performance on:

Labs (15%)

There will be 11 lab assignments, which will be graded for accuracy and completion. Labs will be assigned at the beginning of recitation, and will be due prior to the start of the next recitation. Guidance and help with labs will be offered during recitation. Labs are to be submitted through CourseWeb by the due date. Any late assignments will earn a maximum score of 75%; however, no assignments will be accepted beyond 24 hours after the deadline has passed. Each lab assignment will be weighted equally when calculating your final grade, and your lowest lab score will be dropped only if you have completed all lab assignments.

Homework Assignments (35%)

There will be 6 homework assignments, which will be graded for both accuracy and completion. Homework assignments are to be submitted through CourseWeb by the due date. Any late assignments will earn a maximum score of 75%; however, no assignments will be accepted beyond 24 hours after the deadline has passed. Homework assignments will be a mix of conceptual questions, traditional data analysis problems, in which you must select the appropriate statistical method to use and perform analysis in software, and case studies, in which you must analyze a published article for its statistical merits. Each homework assignment will be weighted equally when calculating your final grade, and your lowest homework score will be dropped only if you have completed all homework assignments.

Exams (50%)

You will take three in-class exams, each weighted equally. Exams are closed book and closed note, except for one sheet of 8.5" × 11" (both sides) of your own notes. These notes cannot include example questions from homework or quizzes. You will turn in your notesheet with your exam. You should bring a calculator not on your cell phone. The use of computers, cell

phones, or other internet-attached devices will NOT be permitted during exams. The exams may consist of true/false, multiple choice, and short answer questions. Exams will cover material presented in class, and covered in the homework and lab assignments.

These exams cannot be taken early or late without a compelling reason and supporting documentation. Students who cannot be present on the day of an exam will be required to take the exam on the first earlier available date. Notification must be given to the instructor in advance. Exams cannot be taken before the day of the exam.

Grading concerns

Concerns about the grading of homeworks, labs, or exams are to be made to only the instructor and will only be considered if discussed in writing (email) within 1 week of returned assignment or posted exam.

Course Prerequisites, Description, and Goals

BIOST 2011 is an introductory applied biostatistics course, which introduces the concepts of statistical reasoning as applied to the study of public health problems. This course is designed for public health students that expect to primarily to be able to read and understand statistical procedures in the form of books, journal articles, reports, grants, etc. for public health students and health career professionals who will make use of statistical methods in research projects or in interpreting literature. The course will also give students the ability to perform some basic analyses. Students who intend to be professional research workers in public health areas requiring the daily application of quantitative procedures and statistics should consider taking BIOST 2041. 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:

- Select quantitative data collection methods appropriate for a given public health context
- Describe basic concepts of probability, random variation, and commonly used statistical probability distributions.
- Describe preferred methodological alternatives to commonly used statistical procedures when assumptions are not met.

- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
- Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate. To include:
 - Apply descriptive techniques commonly used to summarize public health data.
 - Apply common statistical methods for inference.
 - Apply basic regression methodology.
 - Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
- Interpret results of data analysis for public health research, policy or practice.
- Explain quantitative methods and policy analysis research and evaluation methods to address health issues at multiple (individual, group, organization, community and population) levels

Course Competencies

CEPH MPH Competencies

#2. Select quantitative data collection methods appropriate for a given public health context.

#3. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate.

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

Academic Integrity

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.

Diversity

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. 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 instructor;

- The Pitt Public Health Associate Dean for Diversity at 412-624-3506 or nam137@pitt.edu;
- The University's Office of Diversity and Inclusion at 413-648-7860 or <https://www.diversity.pitt.edu/make-report/report-form> (anonymous reporting form).

Sexual Misconduct, Required Reporting, and Title IX

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: www.titleix.pitt.edu/report/confidentiality 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: www.titleix.pitt.edu/report-0

Statement from the Department of Gender, Sexuality, and Women's Studies [This statement was developed by Katie Pope, Title IX Coordinator, in conjunction with GSWS instructors.]

Disability Services

If you have a disability for which you are requesting an accommodation, please notify the instructor and Disability Resources and Services (www.studentaffairs.pitt.edu/drs/) no later than the second week of term. DRS will verify your disability and determine reasonable accommodations for this course.

Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Tentative Course Calendar (subject to change)

Date	Textbook Reading	Assignments	Class Session/Topic
1/6/20	1		Introduction
		<i>Lab 1 assigned</i>	Recitation: Confounding
1/8/20	2		Exploring Data With Tables and Graphs
1/13/20	3	<i>HW 1 assigned</i>	Describing and Comparing Data
		<i>Lab 1 due, Lab 2 assigned</i>	Recitation: Stata + Descriptive Statistics
1/15/20	4-1, 4-4		Probability
1/20/20			<i>no class (MLK Day)</i>
1/22/20	5-1, 5-2	<i>HW 2 assigned</i>	Discrete Probability Distributions
1/27/20	6-1, 6-2	<i>HW 1 due</i>	Normal Probability Distributions
		<i>Lab 2 due, 3 assigned</i>	Recitation: Probability Distributions
1/29/20			
2/3/20	6-3, 6-4, 6-6	<i>Lab 3 due</i>	Normal Probability Distributions
		<i>HW 2 due (TUESDAY)</i>	Recitation: Review for Exam 1
2/5/20			Exam 1
2/10/20	7-1, 7-2	<i>HW 3 assigned</i>	Estimating Parameters And Determining Sample Sizes
		<i>Lab 4 assigned</i>	Recitation: Confidence Intervals
2/12/20	8-1, 8-2		Hypothesis Testing for One Proportion
2/17/20	9-1	<i>HW 3 due</i>	Hypothesis Testing for Two Proportions
		<i>Lab 4 due, Lab 5 assigned</i>	Recitation: Hypothesis Testing for One & Two Proportions
2/19/20	8-3, 9-3		Hypothesis Testing for One Mean, Matched Pairs
2/24/20	9-2, 9-4	<i>HW 4 assigned</i>	Hypothesis Testing for Two Means
		<i>Lab 5 due, Lab 6 assigned</i>	Recitation: Hypothesis Testing for Two Means
2/26/20	12-1		Analysis of Variance
3/2/20	12-2	<i>Lab 6 due, HW 4 due</i>	Analysis of Variance
			Recitation: Review for Exam 2
3/4/20			Exam 2
3/9/20			<i>no class (Spring Break)</i>
3/11/20			
3/16/20	11-1	<i>HW 5 assigned</i>	Goodness-of-Fit and Contingency Tables
		<i>Lab 7 assigned</i>	Recitation: Goodness-of-Fit and Contingency Tables
3/18/20			(OPTIONAL) Exam 2 Workshop
3/23/20	11-2		Goodness-of-Fit and Contingency Tables
		<i>Lab 7 due, Lab 8 assigned</i>	Recitation: Goodness-of-Fit and Contingency Tables
3/25/20	13-1, 13-2		Nonparametric Tests
3/30/20	13-3, 13-4, 13-5	<i>HW 5 due, HW 6 assigned</i>	Nonparametric Tests
		<i>Lab 8 due, Lab 9 assigned</i>	Recitation: Nonparametric Tests
4/1/20	10-1		Correlation
4/6/20	10-2	<i>HW 6 due</i>	Linear Regression
		<i>Lab 9 due, Lab 10 assigned</i>	Recitation: Linear Regression
4/8/20	10-5		Logistic Regression
	14-2	<i>HW 7 assigned (not collected)</i>	Survival Analysis
4/13/20		<i>Lab 10 due, Lab 11 assigned (not collected). Useful to review HW 7 and Lab 11 for Exam 3</i>	Recitation: Survival Analysis
4/15/20			Review
4/20/20			Exam 3