

Mathematics 263, Sections 7,9 and 11
Introduction to Statistics and Biostatistics
Spring 2013

Overview.

Statistics is the field of study involving (1) the collection, summarization, and analysis of data; and (2) the drawing of inferences about a population from the examination of a sample of the population.

Biostatistics is the application of statistics to biological and medical questions. Biostatistics uses much the same core sets of concepts and principles as does applied statistics in general. The substance-matter knowledge that the biostatistician must learn in order to be successful is biomedical. Biostatistics underlies the process of medical research, playing a key role in each step of scientific inquiry from the research bench to the hospital bedside to the community. Biostatistics is concerned with the development and proper application of methods for study design, data measurement, data generation, and data analysis, these latter methods being used to help understand biomedical data by quantifying variation and/or separating signal from noise. An intellectually stimulating feature of biostatistics is that its fundamental elements of data and variation are ubiquitous, being found in the areas of cell regulation, gene expression, genetic susceptibility, pharmacokinetics, response to therapy, assessment of medical treatments and new technology, adherence to guidelines, and program evaluation.¹

Importance of learning Biostatistics

Biostatisticians are in great demand in academia, industry, and government. The responsibilities of biostatisticians span the entire scientific process. They assist in the design and interpretation of studies, and usually have primary responsibility for implementing protocols for data management, data analysis, and quality assurance.

More generally, the increasingly complex, interdisciplinary, and data-intensive nature of medical research has caused, and will continue to cause, the demand for persons trained in biostatistics to increase. The supply of biostatisticians is currently inadequate, and is not rising quickly enough to keep pace with demand. The imbalance between supply and demand is particularly acute for outstanding biostatisticians that combine excellent quantitative training with the communication skills necessary to succeed in the medical environment².

Objectives of this course

The goals of this course are to introduce each student to the practice of statistics and to prepare each student for future work in statistics. More specifically each student should be able to understand the data utilized and summarized with statistics in the research literatures of the respective field of study. In addition, they should be able to understand statistics reported in popular media so that they could obtain useful information provided by good data.

¹ http://biostat.duke.edu/master-biostatistics-program/frequently-asked-questions#What_is_biostatistics

² http://biostat.duke.edu/master-biostatistics-program/frequently-asked-questions#What_types_of_career

Introduction to Statistics and Biostatistics provides an introduction to selected important topics in statistical concepts and reasoning.

Specific topics include tools for describing central tendency and variability in data; methods for performing inference on population means and proportions via sample data; statistical hypothesis testing and its application to group comparisons; issues of sample size in study designs; and random sample and other study types. While there are some formulae and computational elements to the course, the emphasis is on interpretation and concepts.

Upon completion of the course, students are able to:

- Recognize and give examples of different types of data arising in various fields
- Interpret differences in data distributions via visual displays
- Calculate standard normal scores and resulting probabilities
- Calculate and interpret confidence intervals for population means and proportions
- Interpret and explain a p-value
- Perform a two-sample t-test and interpret the results; calculate a 95% confidence interval for the difference in population means
- Select an appropriate test for comparing two populations on a continuous variable
- Understand and interpret results from Analysis of Variance (ANOVA), a technique used to compare means amongst more than two independent populations
- Choose an appropriate method for comparing proportions between two groups; construct a 95% confidence interval for the difference in population proportions
- Describe different kinds of studies
- Use graphing calculator/Excel to
 - Perform statistical testing
 - Create relevant graphs
 - Interpret output related to the various estimation and hypothesis testing procedures covered in the course

Instructor. Name: Kerima Ratnayaka
Office: MTL 124B(Math Teaching lab)
Phone: 626-2107
E-mail: kerimar@email.arizona.edu
Home Page: math.arizona.edu/~kerimar
Course Web Page: math.arizona.edu/~stats

Office Hours.
Tuesdays 10-10:50am and 3:15-4:00pm
Thursdays 8:30-10:30am
or By appointments

Class Meetings.

Section 7 TR (11:00-12:15) in PSYCH 204

Section 9 TR (12:30-1:45pm) in PSYCH 205

Section 11 TR (2-3:15pm) in PSYCH 205

Textbooks. Introduction to the Practice of Statistics, 7th Edition, by David S. Moore & George P. McCabe is required.

WebAssign. Required for Online HW

Instructions for WebAssign: To create an account for this class go to <http://webassign.net>, click on the Log-In button, then click on the I Have a Class Key button. Class key information (PLEASE USE THE CORRECT CLASS KEY to enroll into the CORRECT SECTION)

Section 7 TR(11-12:15pm) : arizona 9595 8221

Section 9 TR (12:30-1:45pm) : arizona 1691 8636

Section 11 TR (2-3:15pm) : arizona 0902 9130

You must do this even if you have used WebAssign in the past or are using it for another course this semester. There is a 14-day grace period (from the first day of classes) before you must purchase/ submit your **access code for this class**. Each time you log-in, you will see a reminder.

Calculators. Each student is required to have, and to know how to use, a graphing calculator that can do the statistical calculations correlation and linear regression. Some examination questions will require the use of such calculators. No calculator swapping will be permitted during exams. In the classroom, the Texas Instruments TI-84 will be used.

Class Attendance. Attendance is expected and is obviously in a student's best interest. Students are responsible for all information provided in class and on the course web page. Class roll will be taken periodically. Any student who is excused from class for attendance at an officially authorized event must provide a written excuse signed by the Dean of Students no later than one week after the absence. Electronic devices such as cell phones, pagers, watch alarms, etc. must be turned off during class.

Examinations. Three midterm examinations.(tentative dates)

Exam 1-Jan 31st /Exam 2-Feb 26th /Exam 3-April 11th

The final examination (The final exam will be in the regular classroom as scheduled by the University)

Section 7 : May 7th (10:30-12:30pm)

Section 9 : May 8th (1-3pm)

Section 11 : May 6th(3:30-5:30pm)

Unless there are extenuating circumstances, a missed midterm examination or a missed final examination will result in a score of zero for that work. **Makeup tests are given only at the discretion of the instructor.**

If a student earns a higher percentage on the final examination than on one of the midterms, then the student's lowest midterm score will be replaced by the percent scored on the final examination(Note: You will have to take the midterm exams and earn a score to qualify for this policy).

Homework/Quizzes.

Homework & more Section Policies

- The **Excel** assignments, Written **homework** and **pop** quizzes account for 100 points of your final grade.

- Calculation Formula.

$$\frac{\text{Total Score earned}}{(\text{Total possible points} - 10 \% \text{ of the total possible points})} * 100$$

[Note the maximum points you can earn is **100** points]

- The Online **WebAssign** homework account for 100 points of your final grade.

- Calculation Formula.

$$\frac{\text{Total Score earned}}{(\text{Total possible points} - 10 \% \text{ of the total possible points})} * 100$$

[Note the maximum points you can earn is **100** points]

- Homework will be assigned **regularly**.
- Selected homework will be graded and returned at a regular basis.
- **LATE HOMEWORK WILL NOT BE ACCEPTED.**
- Homework will be due at the **beginning of the class**.
- Your name, Section Number and the Instructor's name should be PRINTED on the first page of homework.
- Multiple pages should be stapled together.
- Answers for Each problem should be neatly written, with **all intermediate steps included and the problem number clearly marked.** Written explanations should be included whenever appropriate. Include units on answers. Graphs should be labeled, with the window clearly marked. **You need to show all workings to earn full credit.**
- **You will not be given credit for problems that are not legible.**
- Please remember that **No extra credit** is permitted

- There will be **frequent pop quizzes**. **Quizzes** may be **announced or unannounced**, and **no make-up quizzes** will be given.
- **Most homework questions are to be handled during your instructor's office hours and in the tutoring room.** When time allows, I will discuss solutions to homework problems or to problems similar to those on the homework. This usually involves one or two problems. Class time is devoted to the explanation of the current topic and to the solution of problems involved with this topic.
- **YOU NEED TO SHOW WORK(ALL RELEVANT STEPS) TO EARN FULL CREDIT**

IMPORTANT (Section 7,9 and 11 Policies –In addition to the Course Policies)

- If you are dissatisfied with a grade you are welcome to discuss it with me during office hours
- Class time will not be used for this purpose.
- **You must make an appointment and discuss the grade within 7 academic days of receiving the relevant exam/HW/quiz back from me.**

All students must come ON TIME for class and NO TALKING DURING THE LECTURE.

YOU MUST READ THE RELEVANT LESSON and do your PREP WORK(ACCORDING TO THE SYLLABUS and prepwork sked) BEFORE YOU COME TO CLASS.

Course Grades. Midterm examinations will be worth 100 points each, and the final examination will be worth 200 points. Excel assignments and written homework/quizzes will be worth 100 points, Online WebAssign assignments will be worth 100 points. At the end of the Semester, grades will be assigned based on the following scale:

Total Points	Grade
630-700	A
560-629	B
490-559	C
420-489	D
0-419	E

All electronic devices, particularly cell phones, must be turned off during all exams. Silence and vibration modes are not allowed. The University's Exam regulations for final exam week will be strictly followed, in particular those regarding students with multiple exams on a single day. Now is the time to find out if you have a problem with multiple exams on a single day.

Dropping The Course. The last day to drop without a signature is and the last day to drop with a grade of "W"(if passing) is

Incomplete Grades. If a student fails to complete the course due to circumstances unforeseen, then he or she may qualify for a grade of I, "incomplete" if of the conditions are met:

1. The student has completed all but a small portion of the required work.
2. The student has scored at least 50% on all work completed.
3. The student has a valid reason for not completing the course on time.

4. The student agrees to make up the material in a short period of time.
5. The student asks for the incomplete before grades are due - 48 hours after the final exam.

University Policies. Students are expected to be familiar with and abide by the University of Arizona's Code of Academic Integrity, Student Code of Conduct, and Official Student Email Policy. These policies will be strictly enforced, and any student found to be in violation will be appropriately sanctioned.

Students with Disabilities. If you anticipate issues related to the format or requirements of this course, please meet with your instructor to discuss ways to ensure your full participation in the course. If you determine that formal disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (621-3268; drc.arizona.edu). You should notify me of your eligibility for accommodations by . You and I can then plan how to coordinate your accommodations.