

Mathematics 263-Sections 1 and 3
Introduction to Statistics and Biostatistics
Fall 2014

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.

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

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

- 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

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Office Hours. Mondays 11am-11:45am/Wednesdays 2-3pm/Fridays 1-2pm and 2-3pm

Class Meetings.

Section 1 MWF(9:00-9:50am) in CHVEZ 308

Section 3 MWF(10:00-10:50am) in CHVEZ 308

Class Announcements- SEE Web assign announcements and due dates for Written HW's, Excel assignments

COURSE MATERIALS

- 🐾 **Text** - Intro to the Practice of Statistics, 8th edition by Moore, McCabe, & Craig.
- 🐾 **WebAssign** -Online HW's
- 🐾 **Graphing calculator**
- 🐾 **Software** - Excel with the Analysis ToolPak add-in.
- 🐾 **Class notes-Must purchase from UA book store.**

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

WebAssign. Required for Online HW . WebAssign will be used for problems assigned from the text. Due dates will follow the pacing of the material in the Web course. Free responses will be given 3 attempts. Multiple choice responses will be given one attempt.

Instructions for WebAssign: To create an account for this class go to <http://webassign.net>, click on the Log-In button, and 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 1- **arizona 0257 7051**

Section 3- **arizona 8018 7707**

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.

PLEASE NOTE WE WILL NOT USE WEBASSIGN EMAILS IN THIS CLASS.

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. If you have a different calculator type, **YOU ARE RESPONSIBLE TO SELF LEARN THE TOOLS NEEDED FOR THE CLASS.**

Class Attendance. Attendance is expected and is obviously in a student's best interest. 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 as soon as possible. Electronic devices such as cell phones, pagers, watch alarms, etc. must be turned off during class.

- 🐾 You are responsible for any information given in class, posted in WebAssign, or sent by email from your instructor. Notify the instructor in advance if you must miss class, arrive late to class, or leave early from class. Primary communication from your instructor will be through university email. Check your email frequently. You are expected to behave in accordance to the UA's Code of Academic Integrity and Student Code of Conduct at <http://deanofstudents.arizona.edu/policiesandcodes>.

Examinations. Three midterm examinations.(tentative dates)

Exam 1-September 15th

Exam 2-October 13th

Exam 3-November 19th

The final examination (The final exam will be in the regular classroom)

Section 1-

Thursday 12/18/2014 (8:00 am - 10:00 am)

Section 3-

Friday 12/12/2014 (10:30 am – 12:30 pm)

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**).

Home works/Quizzes

- **Online Webassign HW category**
- **Other HW category(Written HW problems from the text book/Excel Assignments/In class pop quizzes)**
- **Important**

EXAM 1 ,2,3 / Please note you may bring a 3X5 note card (can use BOTH sides/but hand-written notes ONLY)

FINAL EXAM / Please note you may bring a 5X8 note card (can use BOTH sides/but hand-written notes ONLY)
Homework/Quizzes.

Homework & more Section Policies

- The **Excel** assignments, written **homework** and **pop** quizzes account for 100 points of your final grade.
- Calculation Formula.
$$\frac{\text{Total Score earned}}{\text{(Total possible points - 10 \% of the total possible points)}} * 100$$

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

- The Online **WebAssign** homework account for 100 points of your final grade.
- Calculation Formula.
$$\frac{\text{Total Score earned}}{\text{(Total possible points - 10 \% of the total possible points)}} * 100$$

[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. MAKEUP QUIZZES NOT PERMITTED(The only exception would be an official UA Deans excuse)**
 - 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**. Pop **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**

- Excel assignments due at the beginning of class period
 - They have to be computer generated documents
 - You need to have relevant graphs/tables/data from excel included on your document
 - If you have a large data set, a sample of the first 10 rows should be provided

- If you are unable to make it to class, you could submit HW in advance or during the class period its due in MATH108. They have a log book to submit HW's
- **EMAIL SUBMISSIONS WILL NOT BE ACCEPTED**
- *Your emails will be answered within a minimum 24 hour period. Therefore make sure to send your emails in advance*
- 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 (30 MINUTES OF PREPARATION FOR EACH CLASS)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.

September 8- Last day to drop without a W

November 2- Last day to withdraw online through UAccess

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 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 as soon as possible. You and I can then plan how to coordinate your accommodations.