Mathematics 263-Section

Introduction to Statistics and Biostatistics

Fall 2017

Key information

Instructor: Kevin K. Lin

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Required Materials:

- ☙ *Text* - *Introduction to the Practice of Statistics*, **8th edition**, by Moore, McCabe, & Craig. For a lower price, the e-text book can be purchased together with WebAssign access code from **http://webassign.net** .

- ☙ *WebAssign* - For online homework (see below).

- ☙ *Graphing calculator –* 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 RESPONSIPLE TO LEARNING THE TOOLS NEEDED FOR THE CLASS ON YOUR OWN.

- ☙ *Software* – We will use Google Sheets. If others are needed, they will be announced and explained in class.

Main websites:

http://math.arizona.edu/~klin/263   *(course web page for this section)*

https://d2l.arizona.edu/d2l/home/620540 *(I will use D2L only for distributing additional material)*

http://math.arizona.edu/~stats *(Math Department page for general Math 263 info)*

http://www.webassign.net

Class key for WebAssign: `arizona 9830 0216`

- ☙ *Creating an account:* Go to http://webassign.net. Click on the I Have a Class Key button on the right-hand side of the page. Our Class Key is above. If you have used WebAssign in the past, you should use the same user id and password.

- ☙ *Setting up an email address:* When setting up your account, be sure to include an email address that you will check frequently. I will use this email.

- *Purchasing an account:* There is a 14-day grace period starting on August 21ˢᵗ. During this period, you can use WebAssign (along with the electronic text) before making your purchase. You will be reminded of the grace period each time you log in.

Examinations. Tentative dates for midterm exams are

- Exam 1 – Monday, September 11
- Exam 2 – Friday, October 6
- Exam 3 – Friday, November 17
- Final – Monday, December 11

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. You will have to take the midterm exams and earn a score to qualify for this policy.

- Class announcements and due dates will be posted on course web page in a timely manner.

- *I will try to answer your emails within 24 hours, but this will not always be possible. Please make sure to send your emails in advance.*

Tutoring Room- check link for schedule (only instructors with * can help with Math 263)
http://math.arizona.edu/academics/tutoring/math300

Homework: You are welcome and encouraged to work together on all homework, but any work you turn in must be your own.

Quizzes: In-class exam rules apply to in-class quizzes as well.

Class structure

Regular Webassign Homework (100 points) - WebAssign will be used for homework. Assignment deadlines are posted in WebAssign and will always be at 11:59 pm (Arizona time) on the due date. Point values will vary for each assignment. The final homework grade will be the points you have earned out of the total possible points as a percentage.

Written HW, Quizzes and spreadsheet assignments (100 points) – I will give some number of in-class quizzes based on WebAssign assignments. You will also have regular spreadsheet assignments as well as some written problems. The total for quizzes, spreadsheet, and written homework will be the points you have earned out of the total possible points as a percentage.

Spreadsheet assignments due at the beginning of class period

- ❧ They have to be computer generated documents.
- ❧ You need to have relevant graphs/tables/data included on your document.
- ❧ If you have a large data set, a sample of the first 5 rows should be provided.
- ❧ Specific details will be posted on course web page and announced by email.

Midterm Exams (300 points) – Each midterm is 100. If you have been approved for testing accommodations through DRC, notify me ASAP. Please note you may bring a 3X5 note card (can use BOTH sides/but hand-written notes ONLY. These are to be turned in with your exam.

Final Exam (200 points) – A 120-minute comprehensive final. Please note you may bring a 5X8 note card (can use BOTH sides/but hand-written notes ONLY). Again, these are to be turned in with your exam. University policy on final exams will be followed:

https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information,

Missed Exam Policy - If a verifiable emergency arises which prevents you from taking an exam at the scheduled time, you must notify your instructor within 24 hours of the time the exam was scheduled. Make-up exams will be administered only at the discretion of the instructor. If a make-up exam is given, you must provide verifiable evidence which documents the circumstances which prevented you from taking the exam on the originally scheduled date. Unreliable internet access or computer problems are not necessarily acceptable emergencies. Failure to contact the instructor or to provide sufficient evidence of a real emergency will result in a grade of zero. Failure to complete the make-up exam at a mutually arranged time will also result in a zero.

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 environment[2].

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.

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[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

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 and/or computer spreadsheet to
  - o Perform statistical testing
  - o Create relevant graphs
  - o Interpret output related to the various estimation and hypothesis testing procedures covered in the course

Course prerequisites

Appropriate Math Placement Level or Proctored/Prep for College Algebra 88+ or Proctored/Prep for Calculus 65+ or MATH 109C, 110, 112, 113, 116, 120R, 122B, 124, 125 or 129 (Transfer credit for MATH 124, 125,129 okay).

Deadlines: All deadlines for homework, quizzes, exams and other important dates will be posted on the course web page.

Questions should be sent directly to your instructor. Be specific, but brief in your message (section number, assignment number, etc.) and include your full name. IMPORTANT - In order to help you, you must keep a clear record of your work. You may be asked to forward a snapshot.

SAVING AND SUBMITTING ANSWERS FOR HOMEWORK: The number of submissions and point values appear above each question.

- ☙ Every part and every answer field can be entered, <u>saved, and submitted separately</u>.

- ☙ The best practice is to answer only one part at a time and submit. It is not wise to enter several answers that depend on each other and then submit. If your first answer is wrong, the others will be wrong.

- ☙ If you change your answer in only one field and click submit, you will not waste submissions in any other field. If you clear other fields or make other changes, a submission will be counted. The submission is based only on what you have changed. This is another reason for working on one question at a time.

- 🐾 Do not use the submission button at the very end of the assignment. It is not active and does not generate a confirmation of submission.

- 🐾 <u>Free response questions allow 5 submissions. Only the last submission is graded.</u>Multiple choice allows 1 submission. . You could skip the essay parts for questions. Free response <u>answers 4 decimals recommended unless specified otherwise.</u>

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 every class period. 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. In addition, students with more than 3 unexcused absences <u>may</u> be administratively dropped from the course. If you need to miss class for unavoidable circumstances, see your instructor as soon as possible. **Other actions that <u>may</u> result in an administrative drop from this course include failing to sign up for webassign or missing more than 5 assignments.**

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at

http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, see

http://policy.arizona.edu/human-resources/religious-accommodation-policy

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See

https://deanofstudents.arizona.edu/absences

Participating in the course and attending discussion sessions are vital to the learning process. As such, attendance is required at all discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

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 <u>university email</u>. <u>Check your email frequently</u>. You are expected to behave in accordance to the UA's Code of Academic Integrity and Student Code of Conduct at

All holidays or special events observed by organized religions will be honored for those students, who show affiliation with that particular religion,

Course Grades. Midterm examinations will be worth 100 points each, and the final examination will be worth 200 points. Regular Webassign homework (100 points). Written HW, quizzes and spreadsheet assignments (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 follower, 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. University policy regarding grades and grading systems is available at
http://catalog.arizona.edu/policy/grades-and-grading-system

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 are available at

http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and

http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal, respectively.

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.

Other information
1. Due dates will follow the pacing of the material in the course
2. The information contained in the course policy, other than the grade and absence policies, are subject to change with reasonable advance notice, as deemed appropriate by the instructor.
3. Policies regarding expected classroom behavior: all cell phones, mobile devices, and electronic devices needs to be switched off during exams, or as requested by the instructor.
4. Policies on plagiarism, etc., within the Student Code of Academic Integrity, will be enforced. All students must abide by the rules set by the UA deans of students (see http://deanofstudents.arizona.edu/policies)
5. Policies on threatening behavior by students: all students must abide by the rules set by the UA. The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.
6. Policies against discrimination and harassment, along with offices for reporting concerns related to discrimination or harassment. All students must abide by the rules set by the UA. The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.
7. Make-up Policy for Students Who Register Late: Students who register after the first class need to talk to the instructor or email the instructor within 24 hours of enrollment to request for extensions for missed assignments/quizzes.
8. Dispute of Grade Policy: Acceptable time period for disputing a grade on a paper, project, or Exam is within 7 academic days after you receive a grade;
9. *To receive full credit on quizzes and spreadsheet assignments, you must put your name on the assignment.*
10. No late work will be accepted. The only exception would be if you have a Deans Excuse or if you obtained approval from the instructor *prior to the due date.*

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of

independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See

http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism, available at

http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Additional Resources for Students

UA Academic policies and procedures are available at http://catalog.arizona.edu/policies

Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Confidentiality of Student Records

http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa