Mel and Enid Zuckerman College of Public Health
University of Arizona

SYLLABUS
CPH 376: Introduction to Biostatistics
Spring 2015

Time: Mondays and Wednesdays, 9:00 – 10:15am

Location: Drachman Hall, A114

Instructor: Shuang Huang, shhuang@email.arizona.edu, Drachman Hall, 206W

Teaching Assistants
Emily Burgen, eburgen@email.arizona.edu
Kevin Doubleday, kevindoubleday@email.arizona.edu
David Phillips, daphillips@email.arizona.edu
Nathan Grunow, ngrunow@email.arizona.edu

Preceptor
Ashley Scott

Office Hours
Monday 12:00 – 13:00pm Nathan Drachman Hall, A206W #7
Tuesday 2:30 – 4:30pm Shuang Drachman Hall, 206W
Wednesday 11 – 12:30pm David Drachman Hall, 316
Wednesday 12:30 – 2pm Emily Drachman Hall, A206W, #2
Thursday 11 – 12:30pm Kevin Drachman Hall, A206W, #1

Catalog Description
This course introduces biostatistical methods and applications, covering descriptive statistics, probability, and inferential techniques necessary for appropriate analysis and interpretation of data relevant to health sciences. Students will use R statistical software package.

Course Prerequisites
- MATH 112 or higher; pre-health or health education students
- It is assumed that you have a grasp of algebra and basic mathematical notation and skills (e.g., using proper order or operations, solving for x, ability to use a simple calculator).

Course Learning Objectives
At the end of the course, you should be able to:

- Recognize improvements in your statistical literacy
- Explain basic statistical terminology and concepts
- Conduct basic statistical tests by hand
- Determine the proper method to be used in analyzing data sets
- Carry out basic statistical analyses using R
- Review journal articles that present basic statistical summaries and inferences

Program Competencies Covered

- Use basic biostatistical approaches and other modern methodological frameworks to design and test hypotheses.

Course Materials

*Understandable Statistics (10th edition)*, by Brase and Brase

- It is advisable to pick up a copy of the text as soon as possible. This text serves as the foundation for the course. Lectures, examples, and assignments will follow the framework and notation of the text.
- You can pick up a copy at the Health Sciences Center bookstore. You might consider purchasing a hard copy or electronic version from an online retailer (e.g., amazon.com) or sharing one with a fellow classmate and splitting the cost.
- A hard copy is available on reserve at the College of Public Health, Division of Epidemiology and Biostatistics. You can check out the text for only a limited amount of time, however. Check with Laura Brown on the 2nd floor Drachman (southeast corner) for additional information.
- The 9th edition of the text is similar enough, however, you should realize that the page numbers for the assigned readings and sample problems might not match.
- I will assume you have access to a copy of the text and are actively reading. Questions from the assigned reading may appear on homework and exam, regardless of whether they are on the lecture slides. Please read the chapters in the book before you come to lectures so that any questions you have may be solved during class.

*R statistical programming software and RStudio*

- RStudio is a user interface extension for R programming language. Both are free to download. You need both to complete the assignments from this class.
- A detailed step-by-step installation guide for both Windows and Mac OS is posted on D2L.
- There are some slight differences between the Windows and Mac versions. Windows using TA(s): ; Mac using TA(s):
- There are NO mobile versions of either R or RStudio. You need a computer (laptop or desktop) to run them.
- A successful and timely installation of R and RStudio on your computer is crucial to maintaining a good grade in this course. Refer to Grading section for more details.

Handheld calculator

- Your calculator should include the square root and power functions \(x^y\). Other useful features may include parentheses and inverse functions \(x^{-1}\).
- You do not need a graphing or programmable calculator.
- Note that cell phones, laptops, tablets, and other web-enabled devices will not be permitted during exams, so do not rely on these as your sole source for computing.
Course Notes and Communication

- Course notes and other general resources will be available on D2L (d2l.arizona.edu) for review. PowerPoint slides may (intentionally) be incomplete and may not work out all problems in detail. Taking notes in class and using the text will ensure you have a complete set of slides.
- Solutions to problems worked in class will often be posted by the end of the week.
- I reserve the right to discontinue D2L posts (both lecture slides and problem solutions) if I feel not enough students are attending or participating in class. This is not an online class.
- Students will be expected to check the D2L website on a regular basis. All course communication, including announcements and emails, will be conducted via D2L.
- Please make sure you are linked to D2L to receive emails.

Grading/Student Evaluation

Your final grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Letter Grade</th>
<th>Final Percentage</th>
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<tbody>
<tr>
<td>In-Class and Online Exercises</td>
<td>10%</td>
<td>A</td>
<td>90-100%</td>
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<tr>
<td>Homework</td>
<td>15%</td>
<td>B</td>
<td>80-89%</td>
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<td>Exam I</td>
<td>20%</td>
<td>C</td>
<td>70-79%</td>
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<td>Exam II</td>
<td>25%</td>
<td>D</td>
<td>60-69%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
<td>F</td>
<td>59% or less</td>
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<tr>
<td>Extra credit online quizzes</td>
<td>5%</td>
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Mandatory R/RStudio installation policy: a mandatory check for successful installation of R and RStudio on your computer will be performed by the TAs at the beginning of the second lecture on Jan 21st. A failed check will result in a final grade no higher than B regardless of how well you do in other areas of the course. You have at least one week before the second lecture to install R/RStudio, which should leave you ample time to clear any technical difficulties that you have encountered during installation with the TAs.

Extra credit online quizzes: there will be three to four short quizzes offered on D2L that exclusively test your knowledge about R. They will be mainly comprised of multiple choices and true/false questions. You are encouraged to take this opportunity to improve your R skills.

Grades are not curved. Assignments are thoughtfully constructed with intentional scope and sequencing to aid your learning. As a bonus, your two lowest homework grades will be dropped. Your two lowest in-class/online exercises will also be dropped. D2L may automatically provide another calculation of your grade that you should ignore. If you believe that a mistake has been made on grading your homework or exams, please email or ask in person the TA who graded your work to discuss the issue.

In-Class/Online Exercises (Participation)

This component includes:
- Relevant, positive contributions to class and involvement in group exercises
- Completion of any online self-assessments, quizzes, or surveys
- You need to adequately participate in group work and turn in the completed assignment sheet to earn points. Doing other unrelated tasks during class (including doing homework or using
laptops, phones, etc.), leaving early or arriving late, or disrupting the class can decrease this portion of your grade and negate your participation for that day.

- **If you miss class for any reason, you cannot make up any in-class exercises.** It is unnecessary to let me know (in person or via e-mail) the reason why you cannot attend class. The policy of dropping two of these exercises is meant to account for any illness, emergencies or other events that force you out of class.

- Students are encouraged to honestly assess their understanding of material and performance in the course, and to then ask for help, if necessary. To facilitate this there may be quizzes (some of which may be online) throughout the semester that will cover fundamental concepts. These will be graded on a pass/fail basis – where a passing grade is earned by completing the quiz.

**Homework**

- There will be approximately 7 to 10 homework assignments.
- Assignments will be due **before class begins**, typically 1 week from the date they are assigned.
- Expect that by the time you have access to an assignment you can complete the majority of it if you have completed the reading assignment. Expect that we would have covered 50% of the assignment through the lectures.
- Some problems will explicitly require that they be solved using R. You must print out your R output for final submission. Print only relevant and sufficient R output to show your process of solving the problem. Do not include warning or error messages from R due to incorrect code. Hand written R code or output will not be accepted. Solutions using Excel or any other software packages will not be accepted, either.
- For problems that do not require R, both hand written and printed submissions are accepted. It is OK to mix handwritten non-R solutions and printed R solution in one submission.
- Submissions should be on 8.5 x 11 in. paper, **stapled**, neat, legible, logical, and organized. They will likely be returned (or your grade will be reduced) if assignments do not adhere to these instructions. We are not responsible for lost pages if your assignment is not stapled.
- Homework should be handwritten and submitted in paper form. **Submissions will not be accepted via e-mail and we are not using the Dropbox feature on D2L.**
- If you do not submit homework in time, you will receive a grade of 0 for that assignment. No make-up homework assignments will be offered. The policy of dropping your two lowest homework assignments is meant to compensate for emergency events that prevent you from turning in your homework before deadline.
- Homework will not be accepted in parts (e.g., turning in half early and half late).
- Drafts of your homework do not count as placeholders for final versions to be submitted later.
- The best way to excel on the exams is to make sure you have mastered the homework.
- To receive full credit, submissions should describe assumptions, provide general equations, and show intermediate steps. **No partial credit can be awarded if you do not show your work.** For this course the procedure is often more important than the final response.
- Students are expected to review all returned work and ask for help, if necessary.
- Each homework grade will be converted to a percentage. The two lowest percentages will be dropped and the remaining grades will be averaged and then weighted to obtain this portion of your final grade. D2L may automatically provide an alternative calculation of your grade that you should ignore.

**Exams**
There are two exams that will take place in class, plus the final exam. Please clear your schedule for these exam days. Do not schedule plans that will interfere with your final exam.

Calculators are permitted for exams. Laptops, cell phones, and other similar devices with calculators will not be permitted and should not be in sight during exams.

Exams cover material in class, lectures, readings (the text), homework, and any material on self-assessments or quizzes. The format of the exams mimics the format of the homework. They are cumulative in the sense that the material builds upon itself. There will be no R related questions on exams.

All exams will be closed-book with the exception of a formula sheet that we will provide and/or statistical tables, again which we will provide. Make-up exams will only be made available to students that have a legitimate (e.g., medical) excused absence, however they are highly discouraged as these exams will likely differ from the original exam in length (length will increase proportional to the date since the original exam) and by including additional theoretical content.

Points earned from each exam will be converted into a percentage. These percentages will be weighted according to the grading scheme above.

General Student Responsibilities

- Read the syllabus thoroughly and learn the course policies. Prior to asking administrative questions, please consult the syllabus.
- Respect other students, the course staff (using proper language and behavior), and the course methods.
- Take responsibility for your learning
  - Attend all class sessions to avoid getting behind
  - Evaluate your skills and establish learning goals
  - Honestly assess your understanding of concepts and ask relevant questions
  - Consult notes, examples, and the textbook prior to attempting assignments
  - Be prepared for class by keeping up with course material and readings, and adhering to deadlines for assignments
  - Participate by contributing to in-class exercises and completing online components
  - Realize that it is natural to struggle with some concepts, but understand that the course provides guidance and tools to aid your understanding
  - Honestly assess the work you are doing in the class (Are you doing everything that is asked of you? What areas do you need to work on?)

Basic Guidance

- Read
- Listen
- Practice
- Ask
- Keep up

Office Hours

The purpose of office hours is to help you clarify concepts discussed in class or to get answers to informed questions. This means you have read the material, reviewed your notes, and made a solid
attempt on an assignment prior to asking questions. **Assignments will not be “pre-graded” prior to submission.** This is all in an effort to help you independently master the concepts in the homework.

Students often find office hours useful because they allow for specific individualized discussions that may not take place in a classroom setting – especially for those less likely to speak up in class or those with mathematical deficits. It is not uncommon for students to set up recurring weekly meetings during office hours to make sure they are keeping up with the material.

**Class Attendance**
You are responsible for learning all content covered in class, including the in-class exercises, written notes, and any alterations to the syllabus.

All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean’s designee will be honored.)
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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Chapter</th>
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<tr>
<td>1</td>
<td>January 14</td>
<td>Course Policies, Introduction</td>
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<td>2</td>
<td>January 19</td>
<td>Martin Luther King, Jr. Day – No Class</td>
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<td>January 21</td>
<td>Introduction, Definitions</td>
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<td>3</td>
<td>January 26</td>
<td>Frequency Tables, Histograms</td>
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<td>January 28</td>
<td>Statistics, Measures of Center</td>
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<td>4</td>
<td>February 2</td>
<td>Measures of Variation</td>
<td>3, 4, 6</td>
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<td>February 4</td>
<td>Probability and Normal Curves</td>
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<td>5</td>
<td>February 9</td>
<td>Normal Distributions, Z-Scores</td>
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<td>February 11</td>
<td>Normal Distributions Cont’d</td>
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<td>6</td>
<td>February 16</td>
<td>Problem Review</td>
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<td><strong>February 18</strong>  <strong>EXAM 1</strong></td>
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<td>7</td>
<td>February 23</td>
<td>Sampling Distributions of the Mean</td>
<td>6, 5</td>
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<td>February 25</td>
<td>Sampling Distributions Cont’d</td>
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<td>8</td>
<td>March 2</td>
<td>Estimation, Confidence Intervals</td>
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<td>March 4</td>
<td>Confidence Intervals Cont’d</td>
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<td>9</td>
<td>March 9</td>
<td>Hypothesis Testing</td>
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<td>March 11</td>
<td>Hypothesis Testing Cont’d</td>
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<td>10</td>
<td>March 16</td>
<td>Spring Recess – No Class</td>
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<td>March 18</td>
<td>Spring Recess – No Class</td>
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<td>11</td>
<td>March 23</td>
<td>Hypothesis Testing: One-Sample, Mean</td>
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<td>March 25</td>
<td>Hypothesis Testing: One-Sample, Proportion</td>
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<td>12</td>
<td>March 30</td>
<td>Hypothesis Testing: Two-Sample, Means and Proportions</td>
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<td>April 1</td>
<td>Content Review</td>
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<td>13</td>
<td>April 6</td>
<td>Problem Review</td>
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<td><strong>April 8</strong>  <strong>EXAM 2</strong></td>
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<td>14</td>
<td>April 13</td>
<td>Correlation</td>
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<td>April 15</td>
<td>Regression</td>
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<td>April 20</td>
<td>Inferences for Regression</td>
<td>9, 10</td>
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<td>April 22</td>
<td>Inferences for Regression Cont’d</td>
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<td>16</td>
<td>April 27</td>
<td>Chi-Square</td>
<td>10</td>
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<td>April 29</td>
<td>Chi-Square Cont’d</td>
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<td>17</td>
<td>May 4</td>
<td>Content Review</td>
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<td></td>
<td>May 6</td>
<td>Problem Review</td>
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<td>18</td>
<td>May 14</td>
<td><strong>FINAL EXAM (10:30am-12:30pm)</strong></td>
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Communications: You are responsible for reading emails sent to your UA account from your professor and the announcements that are placed on the course web site. Information about readings, news events, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: http://www.registrar.arizona.edu/emailpolicy.htm

Disability Accommodation: If you anticipate issues related to the format or requirements of this course, please meet with me. I would like us 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) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. The official policy can be found at: http://www.registrar.arizona.edu/emailpolicy.htm

Academic Integrity: All UA students are responsible for upholding the University of Arizona Code of Academic Integrity, available through the office of the Dean of Students and online: The official policy found at: http://deanofstudents.arizona.edu/codeofacademicintegrity

Classroom Behavior: (Statement of expected behavior and respectful exchange of ideas) The Dean of Students has set up expected standards for student behaviors and has defined and identified what is disruptive and threatening behavior. This information is available at: http://deanofstudents.arizona.edu/disruptiveandthreateningstudentguidelines

Students are expected to be familiar with the UA Policy on Disruptive and Threatening Student Behavior in an Instructional Setting found at: http://policy.arizona.edu/disruptive-behavior-instructional and the Policy on Threatening Behavior by Students found at: http://deanofstudents.arizona.edu/sites/deanofstudents.arizona.edu/files/Disruptive_threat_bklt_2012.pdf

Grievance Policy: Should a student feel he or she has been treated unfairly, there are a number of resources available. With few exceptions, students should first attempt to resolve difficulties informally by bringing those concerns directly to the person responsible for the action, or with the student’s graduate advisor, Assistant Dean for Student and Alumni Affairs, department head, or the immediate supervisor of the person responsible for the action. If the problem cannot be resolved informally, the student may file a formal grievance using the Graduate College Grievance Policy found at: http://grad.arizona.edu/academics/policies/academic-policies/grievance-policy

Grade Appeal Policy: http://catalog.arizona.edu/2013-14/policies/gradappeal.htm

Syllabus Changes: Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate.