**Syllabus 22S:101**

**Instructor:** Prof. Russo  205 SH  335-0817  rp-russo@uiowa.edu

**Office Hours:** TBA  the best way to reach me

Students seeking outside help are expected to have excellent attendance in the lecture.

**TA:** Jessica Orth.  Jessica will set her own office hours.

**Text:**  *Biostatistics, a Bayesian Introduction*, by G. Woodworth.

**Coverage:** chapters 1-10 & various frequentist topics that are not treated in the textbook (notes will be posted to ICONtent).

**Course Objective:** To gain an appreciation for stat methodology, as it applies to the biological sciences, & to become a critical consumer of statistical information.

**Class meetings:** Please do not arrive late or leave early (or engage in any other behavior such as conversing, newspaper-reading, web-surfing, emailing, twittering, facebooking, etc., that impairs the learning environment of your classmates). The course contains too much material to cover in class. I will try to cover the main ideas, point out subtleties, & provide a framework. You’ll save time & do better in this course if you READ AHEAD.

**Conflicts between S101 class & exams in other courses:** if you have a class with a scheduled exam conflicting with a class meeting of S101, you should attend your S101 class - - even if the exam was scheduled prior to the semester start. Under university policy, the professor in your other class is **obliged** to make an arrangement for you to take his/her exam at an alternate time. You should notify your other professor immediately upon learning of the conflict, & you should notify me if s/he refuses to comply with university policy. I will contact the professor first, & then (if necessary) the Dean.

**Homework:** you will work in teams of 4 students. Teams will be formed in the discussion sections during the first week. HW is due in lecture, 2 Fridays after the due date is posted on the HW link. Each team makes a single submission. HW should be neat & stapled, with team member names & assignment number in the top right corner. Late HW will be penalized. If a team member does not participate, the solution is simple: omit his/her name from the submission.

**Weight of HW, exams & quizzes:**

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>Due</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>HW</td>
<td>10%</td>
<td>due 2 Fridays after the due date is posted</td>
<td></td>
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<tr>
<td>Quizzes (2 days notice)</td>
<td>20%</td>
<td>6-8, Fridays in class</td>
<td>lowest one dropped</td>
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<tr>
<td>Midterm 1</td>
<td>20%</td>
<td>Thurs</td>
<td>25-26 multiple choice problems</td>
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<tr>
<td>Midterm 2</td>
<td>20%</td>
<td>Thurs</td>
<td>25-26 multiple choice problems</td>
</tr>
<tr>
<td>Final Exam (cumulative)</td>
<td>30%</td>
<td>date TBA</td>
<td>25-30 multiple choice problems</td>
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<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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**Grades:**  Final % = a weighted sum of HW, quiz, Midterm & Final exam grades

= \(.10\)HW\% + \(.20\)Quiz\% + \(.20\)Midt1\% + \(.20\)Midt2\% + \(.30\)FinExam\%

As an example, suppose Sally scores 920/1000 on the HW, 65/100 on Midt 1, 75/100 on Midt 2, 90/100 on the Final, & has scores of 10, 7, 12, 8, 4, 11 (out of 12, i.e. 48/60 = .80) on the quizzes. Quiz #5 is dropped & her final % is computed as follows:

Final % = (.10)92\% + (.20)80\% + (.20)65\% + (.20)75\% + (.30)90\% = 80.2

Note, 80.2 < (920 + 48 + 65 + 75 + 90) / (1000 + 60 + 100 + 100)

As a rough guide "A" = 90\%, "B" = 80\%, "C" = 70\%, "D" = 60\%.

**Attendance:**  The class is too large for me to take attendance. Bear in mind: excessive absences result invariably in poor test/quiz scores & a low course grade.

**Make-up quizzes/exams:**  If something comes up (emergency, illness, religious obligation, university activity) inform me or your TA as soon as possible. We will discuss your situation & possibly schedule a make-up. Documentation is required.

**Getting a good grade in this class:**  To do well, you must learn the statistical concepts as well as the methodologies. Understanding the concepts makes it easier to remember the methodologies, you will spend less time studying in the long run & you will perform better on exams. More importantly, an understanding of the concepts will stay with you long after you finish the course, & will undoubtedly be of benefit to you in your chosen field. If your approach is to memorize formulae & not pay attention to the concepts involved in this class, you will (if you have an excellent memory & don't make calculation mistakes) receive a “B” grade at best (but more likely a “C+” grade or lower), by June you will have forgotten most of the formulae that you memorized, & by July it will be as if you had never taken the course.

**Independent Tutors:**  for a list go to [http://www.stat.uiowa.edu/courses/tutors.html](http://www.stat.uiowa.edu/courses/tutors.html)

**Stat Lab:**  [http://www.stat.uiowa.edu/courses/tutorial-lab.html](http://www.stat.uiowa.edu/courses/tutorial-lab.html)

**Policies:**  course policies are governed by the College of Liberal Arts and Sciences.

For University policies regarding Student Rights and Responsibilities go to [http://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert](http://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert)

**Student disabilities:**  I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please see me after class or during office hours.

Dept. of Stat & Act. Sci., 241 SH, 335-0712
Prof. Tierney, DEO, luke-tierney@uiowa.edu
Course Topics

Descriptive statistics and histograms.

Probability theory. The main rules of probability, partitioning & other techniques, conditional probability, Bayes’ Theorem & tabular Bayes’ method.

Expected value & conditional expected value of random variables.

Prior & posterior distributions, posterior probabilities, credible intervals & sets.

Density functions, obtaining probabilities, conditional probabilities & expectations from density functions.

Binomial probabilities & the normal approximation to the binomial distribution.

Beta priors & beta posteriors, normal approximation of the beta distribution, use of the beta table on “betatailarea.xls”

Frequentist confidence intervals & p-values associated with rates, differences between rates, means, & differences between means. The use of the t-table with small samples.

Reverse engineering of confidence intervals to obtain the numbers of successes & failures in an experiment.

Posterior distributions of $\Delta = \text{the difference between two rates}$, $RR = \text{the Relative Risk}$ & $OR = \text{the Odds Ratio}$. Posterior probabilities and credible intervals for $\Delta$, $RR$ & $OR$. Reverse engineering of confidence intervals & p-values to obtain posterior probabilities for $\Delta$, $RR$ & $OR$.

Prospective vs. Retrospective studies & the use of RR & OR

Posterior distributions for population means & differences between population means, reverse engineering of frequentist confidence intervals & p-values to obtain posterior probabilities.

Transformations of data & the posterior distribution of the population median.

Regression & correlation, the three sums of squares, $R^2$, $s$, residual analysis, aggregation & disaggregation of regression models

Logistic regression & the estimation of rates.

The Kaplan-Meier Survival Function.
Teaching Policies & Resources — Syllabus Insert

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at http://clas.uiowa.edu/students/handbook.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2, k.11).

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.
Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.