

Biost514/517: Applied Biostatistics I

If you are not sure whether this course (Biostat 514/517) is the right Biostatistics course for you, please note you may be eligible to take Biost 508 or 511 instead. Please see [this guide](#) (<https://www.biostat.washington.edu/courses/sequences>) to introductory Biostatistics courses.

Please note there are special arrangements for Week 1, i.e. September 27, 28 and 29. Please read the details on [this page](https://canvas.uw.edu/courses/1115117/pages/special-arrangements-for-week-1) (<https://canvas.uw.edu/courses/1115117/pages/special-arrangements-for-week-1>).

Navigation

See links (left) for lecture recordings, assignments, submitting homework assignments, the course discussion boards and the course's Canvas "syllabus" (really a schedule of events). For everything else, see the pages on;

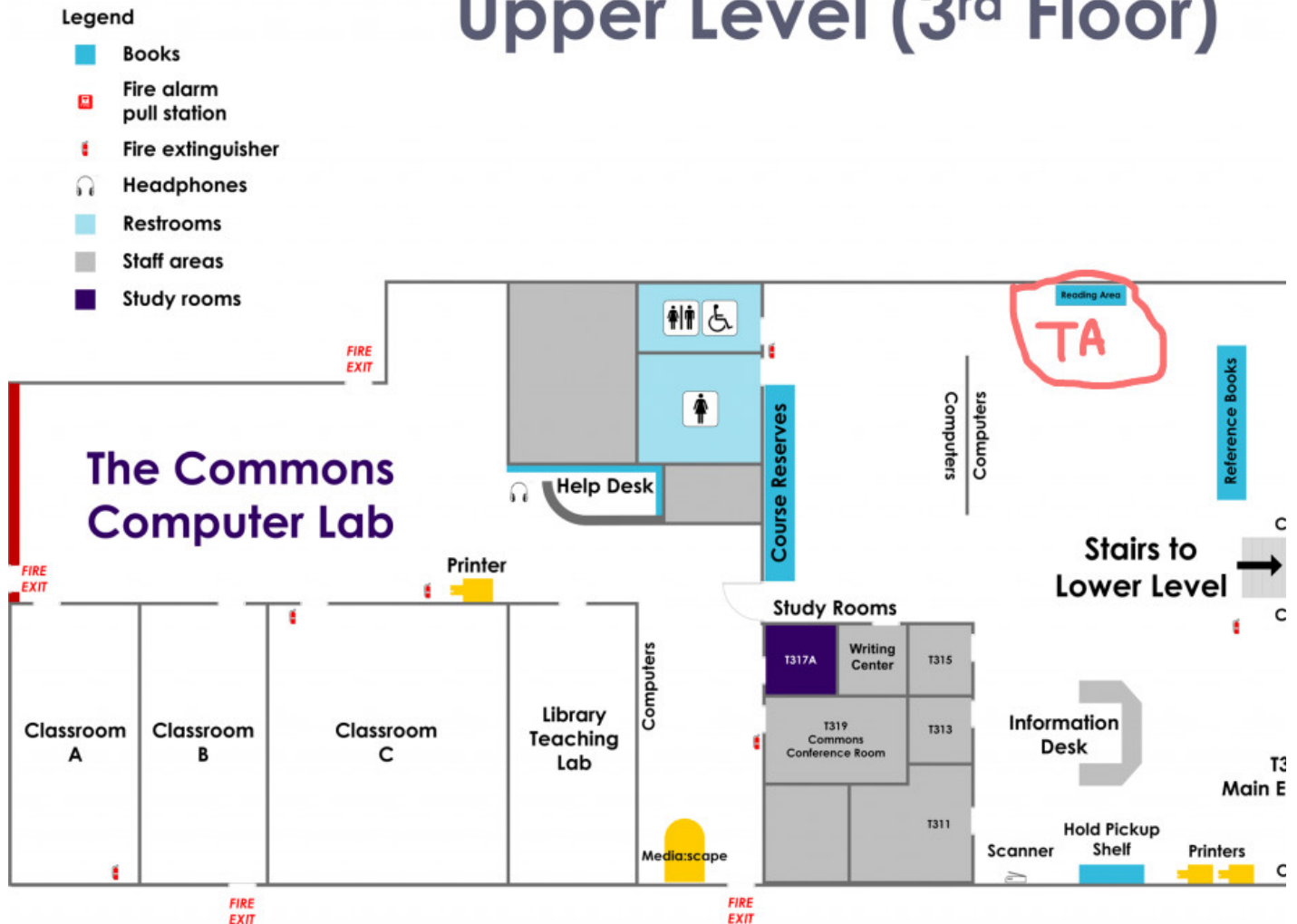
- [About Biost 514/517](https://canvas.uw.edu/courses/1115117/pages/about-514-slash-517) (<https://canvas.uw.edu/courses/1115117/pages/about-514-slash-517>) - course content, pre-requisites, grading, etc
- [Lecture And Discussion Section Material](https://canvas.uw.edu/courses/1115117/pages/lecture-and-discussion-section-material) (<https://canvas.uw.edu/courses/1115117/pages/lecture-and-discussion-section-material>)
- [Homework assignments, data, and keys](https://canvas.uw.edu/courses/1115117/pages/homework) (<https://canvas.uw.edu/courses/1115117/pages/homework>)
- [Other Resources](https://canvas.uw.edu/courses/1115117/pages/other-resources) (<https://canvas.uw.edu/courses/1115117/pages/other-resources>) - other material

Logistic details

- Instructor: [Ken Rice](http://faculty.washington.edu/kenrice/) (<http://faculty.washington.edu/kenrice/>)
- TAs: Tyler A. Bonnett (tbonnett@uw.edu (<mailto:tbonnett@uw.edu>)), Yunqi Bu (yunqibu@uw.edu (<mailto:yunqibu@uw.edu>)), David Clausen (dsc24@uw.edu (<mailto:dsc24@uw.edu>)), Arash Tarkhan (atarkhan@uw.edu (<mailto:atarkhan@uw.edu>)), Parker Xie (pxie73@uw.edu (<mailto:pxie73@uw.edu>))
- Questions? First try the discussion pages. Then send email to: kenrice@uw.edu (<mailto:kenrice@uw.edu>), and the TAs - please email *all* of us when you have questions about HW/lecture material
- Lectures: MWF, 9:30 - 10:20
- Classroom: Health Sciences Building, Room [D209](http://depts.washington.edu/hsrr/matrix) (<http://depts.washington.edu/hsrr/matrix>)
- Discussion Section: (check calendar for week-by-week changes)
Section 517AA: M 8:30-9:20 HSR RR134
Section 517AB: W 11:30-12:20 HST T747
Section 517AC: T 8:30-9:20 HST T747
Section 514AA: F 8:30 - 9:20, HST T530 (Biostat students)

- Office Hours: (TA will change from week to week)
Ken: 10.30am-noon, Tuesdays, Health Sciences Building [Fwing](#)
(<http://www.washington.edu/maps/#!/hsf>), room F656 - bring a laptop if you want to discuss code
TAs: 1.30-2.30pm, Wednesdays, Thursdays, Fridays, in Health Sciences Library - see map below, bring a laptop if you want to discuss your code

Upper Level (3rd Floor)





(Click to embiggen)

- Homework Schedule: Monday-Monday, initially. Later in the quarter this may change, due to holidays and exams
- Exams:
 - Midterm, **Friday Nov 3rd** in class i.e. 9:30-10:20, D209 (surnames A-L), T530 (surnames M-S) and RR134 (surnames T-Z). This is a closed book exam: no electronic devices or notes are permitted. Bring something to write with, and make sure you know where to go prior to the exam.
 - Final: **Wednesday Dec 13th**, in room D209 and T747, 8:30-10:20am

About 514/517

Course Objectives: This course provides an introduction to applied statistics, with an emphasis on medical, biomedical, and epidemiological data. The course is designed for graduate students in public health and medical fields. The major topics covered are data summary, introduction to statistical inference including 'simple' (i.e. one-covariate) regressions, and statistical testing. The role of these in scientific applications is stressed throughout.

Students are expected to have completed a course in second year algebra, and to be conversant with graphs, linear equations, e , natural logarithms, and summation notation. Review material [is available](https://canvas.uw.edu/courses/1115117/files/43727230/download?wrap=1) (<https://canvas.uw.edu/courses/1115117/files/43727230/download?wrap=1>)  (<https://canvas.uw.edu/courses/1115117/files/43727230/download?wrap=1>)  (<https://canvas.uw.edu/courses/1115117/files/43727230/download?wrap=1>). Students who may find this course's presentation too fast or technical are encouraged to consider the Biostat 511/512/513 sequence instead, or Biost 508.

Learning Objectives: At the end of the course a student should be able to:

- Demonstrate an organized approach to the analysis of data collected to answer a scientific question
- Refine a scientific question into a statistical framework. This includes:
 - Identifying response variables and appropriate summaries of them
 - Identifying covariates of interest Identifying potential confounding variables
 - Identifying unmeasured confounders and describing the potential impact of unmeasured confounding
 - Identifying precision variables Identifying scientific questions that translate to effect modification
- Perform descriptive analyses of univariate and multivariate data. This includes:
 - Identifying and computing appropriate summary statistics
 - Identifying and constructing appropriate graphical displays
- Define the sampling distribution of a statistic
- Compute parameter estimates for population parameters of interest (e.g. moments, quantiles, simple regression-based summaries) using statistical software, and corresponding standard error estimates and confidence intervals
- Interpret confidence intervals correctly
- Implement statistical tests using statistical software, computing test statistics and p-values
- Interpret p-values correctly
- Identify situations where statistical hypothesis testing is appropriate and inappropriate
- Present the results of a data analysis to a statistically naïve reader
- State the assumptions required for the validity of conclusions from a data analysis
- Identify the important components of a power analysis and determine sample sizes necessary to provide adequate precision of estimates

Course Website: A Canvas site will be maintained to provide access to all course materials, including slides, and lecture recordings. (Note that printed hard copies of the slides will not be provided.) A

discussion board will be available; to which any student in the class may post. The TAs and instructor will monitor the discussion.

Texts: Recommended but **not** required texts are;

- Vittinghoff et al, Regression methods in biostatistics
- Kleinbaum and Klein, Survival Analysis – a self-learning text

Electronic version can be accessed free, through [SpringerLink](http://link.springer.com/) (<http://link.springer.com/>), though UW login may be required.

Contacting the Instructor and TAs: Questions of general interest should be posted to the Discussion Board on the class website. For other questions, the recommended (and most expedient) way to have a question answered is to come to office hours. Questions not of general interest should be sent to the instructor and all TAs, who will answer questions by email as time permits; during some periods this may take several days.

Statistical Computing: The course notes will use R. Students are free to use R or Stata, and homework keys will be provided for both. The instructor and TAs are not responsible for any differences between versions of Stata (e.g. v13.0 vs 14.0). Homework and exam questions may ask students to interpret R output. Students not using Stata or R are responsible for their own software support, at all times.

- R is free to [download and use](http://www.r-project.org/) (<http://www.r-project.org/>), without restriction. Students considering using R for the first time (or even those familiar with it) may also find the [R Studio](http://www.rstudio.com/) (<http://www.rstudio.com/>) "front-end" helpful; this is also free. R is also available for use at the [Health Sciences Library Computing Lab](http://hsl.uw.edu/topics/learning-commons) (<http://hsl.uw.edu/topics/learning-commons>). Documentation for R is [available through R itself](http://www.statmethods.net/interface/help.html) (<http://www.statmethods.net/interface/help.html>) with many online resources also available, such as the [UCLA resources for learning R](http://www.ats.ucla.edu/stat/r/) (<http://www.ats.ucla.edu/stat/r/>).
- Stata is not free, but discounted personal copies of Stata 13 are available for UW Health Sciences [faculty and staff](http://www.stata.com/order/new/edu/gradplans/campus-gradplan/) (<http://www.stata.com/order/new/edu/gradplans/campus-gradplan/>) and at even greater discounts for [students](http://www.stata.com/order/new/edu/gradplans/student-pricing/) (<http://www.stata.com/order/new/edu/gradplans/student-pricing/>). Having *at least* Stata IC is strongly recommended; "Small Stata" will not be sufficient to handle all the examples and exercises in this class. Stata is also available for use at the [Health Sciences Library Computing Lab](http://hsl.uw.edu/topics/learning-commons) (<http://hsl.uw.edu/topics/learning-commons>). Documentation for Stata is [available through Stata itself](http://www.stata.com/support/documentation/) (<http://www.stata.com/support/documentation/>), with many online resources also available, such as the [UCLA resources for learning Stata](http://www.ats.ucla.edu/stat/stata/) (<http://www.ats.ucla.edu/stat/stata/>).

Computer Lab: Access is provided to the PCs in the Micro Computing Laboratory in the Health Sciences Library. The lab is accessible whenever the library is open, except the lab closes one-half hour earlier than the library. There are no reserved times for the HSL computing room but a teaching assistant will be available for consultation at regular times (see TA schedule).

Assignments: Weekly homework (10 assignments total) will be due, one each week on the Canvas website. Please submit your homework as a word-processed document in .pdf format.

All the homework in this class is viewed as an important part of the process of your learning. You are encouraged to do the best work you can as soon as possible after requisite material is covered in class, and to complete the homework exercises on your own, as much as possible. However working together with others to solve challenging problems is acceptable, as is asking questions of the TAs or instructor. It is nevertheless expected that your written homework gives a summary of *your* personal understanding of the answers, independent of others. For more details about academic integrity and expectations for student conduct, please see the [UW School of Public Health Academic Integrity Policy](http://sph.washington.edu/students/academicintegrity/policy.asp) (<http://sph.washington.edu/students/academicintegrity/policy.asp>).

Homework will be graded 10, 9 or 0 on a good-faith-effort basis. To encourage students to attempt all parts of all homeworks, grading will use the following criteria:

10: A good-faith effort was made on all parts of all problems.

9: A good-faith effort was made on all but *very minor* parts of one or a few problems. (For example, omitting a small component in part of a question)

0: At least one important part of a problems, or many minor parts of problem(s) did not receive a good-faith effort. (For example, not attempting to answer part of a question, or not attempting a whole question)

Late homework will not be accepted, with no exceptions. Homework not turned in will be scored zero. Please note the grading scheme (below) does not penalize missing one submission over the course of the quarter.

Grading and Exams: Course grades will be composed of;

- 30% Midterm Exam
- 40% Final Exam
- 30% Homework

The midterm and final exams will be in-class exams. Exams are closed-book and closed notes. Total score on the best 9-out-of-10 homeworks (see the good-faith scoring system above) contributes 30% towards your grade.

Access and Accommodations: Your experience in this class is important to us, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you experience barriers based on disability, please seek a meeting with Disability Resources for Students (DRS) to discuss and address them. If you have already established accommodations with DRS, please communicate your approved accommodations to the instructor at your earliest convenience, so we can discuss your needs in this course.

Disability Resources for Students (DRS) offers resources and coordinates reasonable accommodations for students with disabilities.

Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or <http://depts.washington.edu/uwdrs> (<http://depts.washington.edu/uwdrs>).