

STA 503-001: Introduction to Statistical Methods
Course Information and Syllabus Document

Fall 2006
Dr. Charnigo

Contact information

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Office Hours: 4:00 to 6:00 p.m. on Tuesdays in 203-B College of Public Health,
except when otherwise announced

About this course

Catalog Description: Summary statistics, graphical methods, point and interval estimation, hypothesis testing, experimental design, simple and multiple regression, ANOVA as a special case of regression, categorical data analysis. Lecture, three hours; laboratory, two hours per week.

Objectives:

1. You will gain a conceptual understanding of point and interval estimation as well as of hypothesis testing.
2. You will learn how to make inferences about population parameters and some functions of population parameters based on one-sample and two-sample data.
3. You will learn how to use a linear regression model to relate the mean of a numeric response variable to the values of one or more explanatory variables. This will include issues of interpretation and inference as well as of model comparison and diagnostics.
4. You will learn how to use a logistic regression model to relate the log odds of an affirmative outcome for a dichotomous response variable to the values of one or more explanatory variables. Again, this will include issues of interpretation and inference as well as of model comparison and diagnostics.
5. You will learn how to use a proportional hazards regression model to relate the log hazard function for a time-to-event response variable to the values of one or more explanatory variables. Once more, this will include issues of interpretation and inference as well as of model comparison and diagnostics.
6. You will acquire some level of proficiency with SAS, an extremely useful statistical software package.

Textbook: Rosner, Bernard (2005). *Fundamentals of Biostatistics*, sixth edition.
Belmont, CA: Thomson.

Prerequisite: Graduate standing in the Statistics Department.

Course policies and logistics

Class Meetings: We will meet in CB 307 on Tuesdays and Thursdays from 12:30 to 1:45 p.m. and on Fridays from 12 Noon to 1:50 p.m. (except on: Friday 06 October, Fall Break; Thursday 23 November, Thanksgiving Break; Friday 24 November, Thanksgiving Break). Tuesdays and Thursdays will be devoted to lectures. Most Fridays will be devoted to laboratory activities. See the tentative schedule for details.

E-mail Memoranda and Course Materials: I will be sending e-mail memoranda regularly to distribute course materials, post grade information (for those who request it), and make announcements. Course materials will also be available from my home page, (www.ms.uky.edu/~richc). Please inform me if you are not receiving the memoranda.

Written Assignments: There will be five written assignments for you to prepare outside of class, tentatively due by 2:00 p.m. on the Mondays of 18 September, 16 October, 06 November, 20 November, and 11 December. You are encouraged to work in self-selected groups of two or three, in which case it suffices to hand in one copy of the assignment for the group; however, you may work individually if you prefer. Many items on the written assignments will require the use of statistical software. Do not worry if you have little or no prior experience with statistical software, as you will become familiar with SAS during laboratory. Written assignments are to be submitted in hard copy, to me in person or under my office door (CPH 203-B), unless you have obtained permission to use an alternative mechanism for submission.

Examinations: There will be an in-class midterm examination from 12 Noon to 1:50 p.m. on Friday 20 October. There will be a final examination at the University's designated time from 1:00 to 3:00 p.m. on Thursday 14 December. The examinations are open-book in the sense that you may refer to any printed materials that you care to bring, including the textbook and your notes. However, you may not share printed materials or calculators during examinations, you may not use a computer or otherwise go "online" during examinations, and there is to be no collaboration on examinations.

Grading: Your grade for the course will be determined by the written assignments (30%), the midterm examination (35%), and the final examination (35%). There may be opportunities to earn bonus points. The cutoff for an "A" will be no higher than 90%, the cutoff for a "B" will be no higher than 75%, and the cutoff for a "C" will be no higher than 60%.

Late Policy: Cases involving any of the following will be handled individually: University-excused absences, University-prescribed academic accommodations, recommendations for special consideration from the office of an appropriate Dean or the Ombud. Otherwise, a late submission can be accepted only within 24 hours and then only at 75% credit. Such a submission should be left under my office door (CPH 203-B).

Makeup Policy: Cases involving any of the following will be handled individually: University-excused absences, University-prescribed academic accommodations, recommendations for special consideration from the office of an appropriate Dean or the Ombud, legitimate scheduling difficulties of which I am informed at least ten days in advance. Otherwise, makeup examinations for unexcused absences will be available only at 75% credit and must be completed within five days.

Accommodations: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (www.uky.edu/TLC/grants/uk_ed/services/drc.html). If you have not already done so, please register with the Disability Resource Center (Room 2 Alumni Gym, 257-2754, jkarnes@uky.edu) for coordination of campus disability services available to students with disabilities.

Academic Honesty: The Department of Statistics, the College of Arts and Sciences, and the University of Kentucky place a premium on academic honesty. Please refer to the University of Kentucky Student Rights and Responsibilities document (www.uky.edu/StudentAffairs/Code/part2.html).

Unforeseen Contingencies: In the unlikely event that an unforeseen contingency requires additional course policies, you will be promptly notified in an e-mail memorandum.

Tentative schedule

Lectures Laboratory (Agenda)	Topics (Relevant sections of the textbook)
R 08/24 F 08/25 T 08/29 R 08/31 F 09/01 (WA1)	Numerical and graphical summaries of data; probability and conditional probability; screening tests, Bayes' Theorem, and the receiver operator curve (2.1 - 2.8, 3.1 - 3.7, 3.9)
T 09/05 R 09/07 F 09/08 T 09/12 R 09/14 F 09/15 (WA1)	Discrete probability distributions; continuous probability distributions; sums of random variables and the Central Limit Theorem; relationships among families of distributions; population versus sample; point and interval estimation of a mean; point and interval estimation of a variance; point and interval estimation of a proportion; maximum likelihood (4.1 - 4.9, 5.1 - 5.7, 6.2, 6.5, 6.7, 6.8)
T 09/19 R 09/21 F 09/22 T 09/26 R 09/28 F 09/29 (WA2)	Introduction to hypothesis testing; test concerning a mean; test concerning a variance; test concerning a proportion; power and sample size; relating estimation to testing; paired and unpaired tests concerning two means; test concerning two variances (7.1 - 7.7, 7.9, 7.10, 8.1 - 8.7)
T 10/03 R 10/05 T 10/10 R 10/12 F 10/13 (WA2)	Test concerning two proportions; power and sample size; comments about outliers; one-way layouts and the analysis of variance; multiple comparisons and linear contrasts; two-way layouts and the analysis of variance (8.9, 8.10, 10.1 - 10.3, 10.5, 12.1 - 12.4, 12.6)
T 10/17 R 10/19	The simple linear regression model; the principle of least squares; interpreting the slope coefficient; inferences about the slope coefficient; estimation of the mean response and prediction; checking model assumptions; correlation (11.1 - 11.8)
F 10/20 (Midterm)	<i>MIDTERM EXAMINATION from 12 Noon to 1:50 p.m.</i>

<p>T 10/24 R 10/26 F 10/27 (WA3)</p>	<p>The multiple linear regression model; interpreting the partial slope coefficients; inferences about the partial slope coefficients; partial F tests; estimation of the mean response and prediction; relationship to analysis of variance (11.9)</p>
<p>T 10/31 R 11/02 F 11/03 (WA3)</p>	<p>Multiple linear regression, continued: collinearity; influential observations; checking model assumptions; variable selection algorithms; comparing models (11.9)</p>
<p>T 11/07 R 11/09 F 11/10 (WA4)</p>	<p>Relative risks and odds ratios; epidemiologic study design; the phenomenon of confounding (13.3, 13.4)</p>
<p>T 11/14 R 11/16 F 11/17 (WA4)</p>	<p>The logistic regression model; interpreting the partial slope coefficients; inferences about the partial slope coefficients; likelihood ratio tests; estimation of risk; diagnostics; comparing models (13.7)</p>
<p>T 11/21 T 11/28 R 11/30 F 12/01 (WA5)</p>	<p>Survival and hazard functions; censoring; Kaplan-Meier estimation of survival functions; log-rank test for comparing survival functions; digression on nonparametric methods (14.8 - 14.10, 9.1 – 9.4, 12.7)</p>
<p>T 12/05 R 12/07 F 12/08 (WA5)</p>	<p>The proportional hazards regression model; interpreting the partial slope coefficients; inferences about the partial slope coefficients; likelihood ratio tests; diagnostics; comparing models (14.11)</p>
<p>R 12/14 (Final)</p>	<p><i>FINAL EXAMINATION from 1:00 to 3:00 p.m.</i></p>