

Biostatistics 513 – Medical Biometry III Spring 2013

Lecture: MWF 9:30 am – 10:20 am

Location: HSB T-439

Discussion Sections:

W: 8:30 am – 9:20 am, T-639 (AB)

W: 10:30 am – 11:20 am, T-747 (AC)

Th: 8:30 am – 9:20 am, T-531 (AA)

Discussion sections will be held in the HS Library Computer Lab (Rooms A & B) on the 3rd floor of the library unless announced otherwise.

Instructor: David Yanez (**DY**)

Associate Professor, Dept. of Biostatistics

F-666, F-wing, Health Sciences Building

Phone: 543-8027

Email: yanez@uw.edu

Office hours: see chart below, or by appt.

TA's: Hannah Cohen-Cline (hannahcc@uw.edu) (**HCC**)

Clara Dominguez (cpdi@uw.edu) (**CD**)

Sharanya Rajagopal (srajagop@uw.edu) (**SR**)

Phillip Keung (pkeung@uw.edu) (**PK**)

The chart below shows the times of class meetings and instructor/TA office hours. TA's will hold office hours in the Health Sciences Library Microcomputer Lab (3rd floor T-wing) unless noted otherwise.

	Mon	Tues	Wed	Thurs	Fri
7:30					
8:30	CD		Discuss	Discuss	
9:30	Lecture	SR	Lecture		Lecture
10:30	HCC	SR	Discuss		DY
11:30	HCC	SR	DY	CD	PK
12:30			DY		
1:30					PK
2:30			HCC		PK
3:30					PK
4:30					

Course Objectives: This course introduces the principles and methods of statistical inference for categorical data and survival data. The major topics covered are: contingency table methods; logistic regression; Kaplan-Meier and log-rank methods; and Cox regression.

Upon entering this course the student is expected to be able to:

- use a statistical package (STATA) to enter data, calculate summary statistics, and perform basic statistical inference procedures.
- perform one and two-sample hypothesis tests for binary data (proportions).
- compute and interpret confidence intervals for one-sample and two-sample situations.
- perform “multivariable” linear regression and interpret model coefficients, compute confidence intervals for model coefficients, and test hypotheses using the partial F test.

Learning Objectives: Upon completion of the course, students should be able to ...

- perform standard tests of homogeneity and trend with data from $2 \times C$ tables.
- compute odds ratio estimates and confidence intervals from 2×2 and stratified 2×2 tables.
- perform logistic regression to estimate model coefficients and odds ratios (adjusted), compute and interpret coefficient and odds ratio confidence intervals, and test hypotheses that one or more coefficients in the logistic regression model are zero.
- compute and interpret the product limit estimate (Kaplan-Meier) estimate of survival and associated confidence intervals.
- perform and interpret the log-rank test for differences between survival curves with right censored survival data.
- perform Cox regression to estimate proportional hazards model coefficients, interpret coefficient estimates and confidence intervals, and test hypotheses that one or more coefficients in the regression model are zero.
- interpret and critique the results of application of these statistical techniques as found in the health sciences literature.

Texts: (previously from 511 & 512 and others on reserve)

Required

- (KKL) *Logistic Regression*, 3rd edition, Kleinbaum and Klein, Springer.
- (KKS) *Survival Analysis*, 3rd edition, Kleinbaum and Klein, Springer.

These texts can be accessed electronically (for free) through the UW library system for the duration of the quarter. From on-campus systems, go to the URL's

KKL: <http://link.springer.com/book/10.1007/978-1-4419-1742-3/page/1>

KKS: <http://link.springer.com/book/10.1007/978-1-4419-6646-9/page/1>

From off-campus, go to

<http://offcampus.lib.washington.edu/login?url=http://dx.doi.org/10.1007/0-387-29150-4>

<http://offcampus.lib.washington.edu/login?url=http://dx.doi.org/10.1007/978-1-4419-1742-3>

Others

- (R) *Fundamentals of Biostatistics*, 6th Edition, Rosner, Duxbury
- (BM) *The Practice of Statistic in the Life Sciences*, Baldi and Moore, Freeman
- (KKMN) *Applied Regression Analysis and Other Multivariate Methods*, 3rd edition, Kleinbaum, Kupper, Muller and Nizam, Duxbury
- (HL1) *Applied Logistic Regression*, 2nd edition, Hosmer and Lemeshow, Wiley
- (HL2) *Applied Survival Analysis*, 2nd edition, Hosmer and Lemeshow, Wiley
- (BD1) *Statistical Methods in Cancer Research Vol 1*, Breslow and Day, IARC
- (BD2) *Statistical Methods in Cancer Research Vol 2*, Breslow and Day, IARC

Course Web Page: A course web page will be maintained to provide access to data sets and other course materials. The address is <http://courses.washington.edu/b513/>.

Lecture Notes: The lecture notes are based on material prepared originally by Prof. Patricia Wahl, and modified by Profs. James Hughes, Patrick Heagerty, Mary Lou Thompson and Norm Breslow. The lecture notes are prepared in advance and available for purchase as a CoursePak at the South Campus Center or can be downloaded from the course website.

Lectures: Lectures will be recorded and posted online. Links can be found on the course website.

Handouts: Copies of course handouts can be found on the website.

Discussion Board: A discussion board has been created for the course. The address is available at <https://canvas.uw.edu>. Any student in the class may post to this board. The TA's and Prof. Yanez will monitor the list.

Statistical Computing: We will use STATA version 12.0 for computing. Versions earlier than 12 should work but some commands may be slightly different.

Stata is available for use at the Health Sciences Library Computing Lab (see below). Documentation for Stata is online and on reserve at the library. I've recorded some introductory videos for using Stata and these are posted on the course website. Additional Stata help resources may be found at <http://www.ats.ucla.edu/stat/stata/>.

You may choose to acquire a personal copy of Stata. Discounted personal copies of Stata 12 are available for UW Health Sciences faculty, students and staff via the Stata web site at: <http://www.washington.edu/itconnect/wares/uware/stata/>. If you purchase a copy of Stata, I recommend getting at least Stata IC.

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: Homework assignments will (typically) be made available on Mondays and will be due on the following Monday by 9:30 am. Homework will be handed in and returned online using the Canvas

Dropbox at <https://canvas.uw.edu>. Homework should be submitted in PDF or Word format. Late homework will not be accepted.

The homework in this class will be used to improve the learning process, and not as a part of the evaluation of your learning. Thus, homework will be marked credit/no credit based on whether or not it represents a good faith effort to answer all the questions. You do not need to give a correct answer for the questions, but you do need to provide evidence of your thought processes on each question, so that graders can tell that you made an effort. Also, because the material in this course is sequential, it is important that you complete the homework and turn it in on time, so that you are ready for the new material that follows it. If you hand the homework in on time and make a good faith effort on each question, you will receive credit for the assignment. Failure to complete any part of the assigned problems does not constitute a good faith effort.

I encourage students to work together or in small groups on the homework problems. A good strategy is for everyone in the group to work on the problems individually and then get together to discuss the more difficult ones. However, the final version you hand in should reflect your own interpretation and understanding. That is, support and assistance with developing answers is encouraged; copying answers is not (**copied assignments will not receive credit**). Finally, except where I explicitly request it, no computer output should be included in your answers to the homework questions.

Disability: If you would like to request academic accommodations due to a disability, please contact Disability Resources for Students, 448 Schmitz, 543-8924 (V/TDD). If you have a letter from Disability Resources for Students indicating you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need for class.

Grading:

30% Midterm Exam

30% Final Exam

20% Homework

20% Online Quizzes (2)

- The midterm and final exams will be in-class exams. Exams are close-book and close notes. You are permitted to bring a single-page (8.5 by 11 in²) crib sheet.
- Online quizzes will consist of approximately 10 true/false and multiple choice questions. You will be allowed 1 hour to complete the quiz within a 6 hour window of availability – see schedule.
- Homeworks can contribute up to 20 points towards your grade. If you hand in 7 or more of your homeworks on time as good faith efforts, then you will receive the maximum possible 20 pts towards your grade.

<u>Number homeworks submitted on time</u>	<u>Number of points (max 20)</u>
> 6	20
6	16
5	12
< 5	0

Certificate vs. Graduate Credit:

Students who are taking this course for graduate credit must complete all the assignments outlined above. Students who are taking this course for a Certificate in Applied Biostatistics must complete the homework assignments and the online quizzes *but are not required to complete the midterm or final exam.*

If you have questions or concerns regarding the content or structure of the class, please feel free to talk (or write) to us at any time during the quarter. To the extent that you are not satisfied with our response, you may contact the Biostatistics Department Chair (bsweir@uw.edu). If concerns are still not satisfactorily resolved, you may also contact the Graduate School at G1 Communications Building by phone at (206) 543-5139 or by email at raan@uw.edu.

Tentative Course Outline

Date	Topic	Discussion	
		Reading	Section
M 4/01	Intro/Overview/RxC tables	BM chap 22	RxC and
W 4/03	Trend test, 2x2 tables		2x2 tables
F 4/05	Fisher exact, Paired binary data, Kappa	R 10.3–10.4	
M 4/08	Stratification/Causal Inference/Confounding		RR,RD,OR
W 4/10	Mantel-Haenszel procedures	R13.5	2x2 tables
F 4/12	Ille-et-Vilaine case study		
M 4/15	Introduction to logistic regression	KKL 1	Logistic
W 4/17	Logistic regression with a binary predictor	KKL 2	Regression
Th 4/18	ONLINE QUIZ – Time limit 1 hr (available 5pm – 11pm)		
F 4/19	Logistic regression with 2 covariates	KKL 3	
M 4/22	Logistic regression: Likelihood	KKL 4	Logistic
W 4/24	Logistic regression: Inference	KKL 5	Regression
F 4/26	Logistic regression: Inference	KKL 5	
M 4/29	Logistic regression: case study		Logistic
W 5/01	Logistic regression for matched data	KKL 11	Regression
F 5/03	Issues in Model building	KKL 6-7	
M 5/06	Issues in Model building		Review/
W 5/08	Prediction, ROC curves		Q&A
F 5/10	EXAM		
M 5/13	Introduction to survival analysis: censoring, survival, hazard	KKS 1	Survival
W 5/15	Nonparametric survival estimation: Kaplan-Meier	KKS 2	Analysis
F 5/17	Comparing survival curves	KKS 2	
M 5/20	Comparing survival curves: Log-rank test	KKS 2	Survival
W 5/22	Proportional hazards (Cox) model	KKS 3	Analysis
Th 5/23	ONLINE QUIZ – Time limit 1 hr (available 5pm – 11pm)		
F 5/24	Cox regression with a single covariate	KKS 3	
M 5/27	Holiday – Memorial Day		
W 5/29	Cox regression with multiple covariates	KKS 3	Survival
F 5/31	Cox regression: Assessing model accuracy	KKS 4	Analysis
M 6/03	Stratification	KKS 5	
W 6/05	Misc. topics		Review/
F 6/07	Review		Q&A

Final Exam: Wed., June 12, 2013. 8:30 am – 10:20 am