STA 6177: Applied Survival Analysis

Fall, 2019

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When: Tuesday 9th period (4:05 – 4:55 pm) at HPNP G-101
Thursday 8th and 9th periods (3:00 – 4:55 pm) at HPNP G-101
Office hours: Dr. Zou (Tuesday: 2:45 – 3:45 pm at CTRB 5211)

Objectives:
This course will cover basic analytic skills for practical survival data analysis. Survival analysis is about the analysis of time-to-event data. It is one of the most widely applied branches of statistics. In public health and medicine, it is the theoretical foundation for the design and analysis of cohort and case-control studies. The goal of this course is to help you understand the fundamental concepts of survival analysis and their applications in epidemiology. Basic concepts from probability and calculus will be reviewed as needed.

Calendar:

Aug.
20 Introduction, review syllabus
   Lecture 1: Probability, random variables, distributions, and expectation & variance
22 Continue Lecture 1
27 Exercise 1
29 Lecture 2: Estimation of probabilities: Prevalence and incidence, LLN and CLT, calculus, and the delta method

Sept.
3 Exercise 2
5 Lecture 3: Fundamental concepts of survival analysis: Censoring, survival and hazard functions, failure-time distributions, and maximum likelihood estimation
10 Exercise 3
12 Lecture 4: Empirical CDF and the Kaplan-Meier and Nelson-Aalen estimators
17 Exercise 4
19 Lecture 5: Cohort studies, measures of association, and accelerated failure time models
24 Exercise 5, Exam 1 review
26 Exam 1

Oct.
1 Review Exam 1 solutions
3 Lecture 6: Log-rank test
8 Exercise 6
10 Lecture 7: Semiparametric relative-risk regression: the Cox model
15 Exercise 7
17 Lecture 8: Cox model: baseline hazard estimation and correction for ties
22 Exercise 8
24 Lecture 9: Building and interpreting regression models
29 Exercise 9
31 Lecture 10: Residuals and goodness-of-fit for regression models

Nov  5 Exercise 10, Exam 2 review
  7 Exam 2
12 Review Exam 2 solutions
14 Lecture 11: Confounding and stratification: Mantel-Haenszel, the stratified log-rank test & Cox regression; Case-control studies and conditional logistic regression
19 Exercises 11
21 Lecture 12: Cox model extensions: Competing risks, recurrent events, and time-dependent covariates
26 Exercise 12
28 Thanksgiving (No class)

Dec.  3 Final exam review, Final exam distributed
  5 No class
10 Final exam due
Class format and website:
Thursday will be two hours of lecture divided into four segments. Each segment will be approximately 20 minutes with 5 minutes for questions. There will be a fifteen-minute break between periods. You are encouraged to bring a hard copy of the lecture notes to class, and laptops are allowed.

Tuesday will be a problem-solving session where we work on the problem sets. This will be crucial for reviewing concepts, learning to apply them, and preparing for the exams. Laptops are allowed.

Class website:
There will be a class website on Canvas. You will need to sign in with your Gatorlink ID and password. Lecture notes, announcements, and other files will be posted here. Technical issues can be resolved at the UF Helpdesk (http://helpdesk.ufl.edu) or E-learning Support (https://lss.at.ufl.edu/help.shtml)

Problem sets:
Problem sets will be given each week unless there is an exam. You are encouraged to work together, but you should write up your own results. They will not be graded, but they will important for learning the material and preparing for the exams.

Exams:
There will be two midterm exams and one final exam. The midterm exams will be in class with open notes. Calculators are allowed, but laptops and cell phones are not. The final exam will be a take-home exam. The exams will use problems adapted from the problem sets.

Readings:
There is no required textbook for the course. The primary readings will be lecture notes.


Software:
All statistical computing in the class will be done in R (https://cran.r-project.org/). An introduction to R is available online (https://cran.r-project.org/doc/manuals/R-intro.pdf). Many of the functions we use will be in the survival package (https://cran.r-project.org/web/packages/survival/survival.pdf). From within R, this can be installed using the command: install.packages(“survival”).

Grading:
The assessment will include class participation, assignments, and two exams. Class participation will include weekly attendance and participation in discussions. Students are responsible for all course material, including reading required materials prior to each class. Failure to complete assignments will result in a failing grade.
15%  Class participation
25%  Exam 1 (in class September 26)
25%  Exam 2 (in class November 7)
35%  Final Exam (due December 10)

The grading scale for this course consists of the standard scale, including minus grades, below. The conversion factors for grade point values that are assigned to each grade are also included (in parentheses):

93% - 100% = A (4.00)  
90% - 92%  = A- (3.67)  
87% - 89%  = B+ (3.33)  
83% - 86%  = B (3.00)  
80% - 82%  = B- (2.67)  
77% - 79%  = C+ (2.33)  
73% - 76%  = C (2.00)  
70% - 72%  = C- (1.67)  
67% - 69%  = D+ (1.33)  
63% - 66%  = D (1.00)  
60% - 62%  = D- (0.67)  
Below 60% = E (0.00)

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar’s Grade Policy regulations at: http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Academic Integrity:
Cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior. Students are expected to act in accordance with the University of Florida policy on academic integrity. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:
https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/
http://gradschool.ufl.edu/students/introduction.html

Policy Related to Class Attendance and Late or Missing Assignments:
Attendance of all class sessions is required. Please see the instructors as early as possible regarding possible absences. All assignments need to be handed in on time. Grading will penalize late assignments. Missed assignments will receive a zero score. Personal issues with respect to class attendance or fulfillment of course requirements (assignments, final presentation, class discussion) will be handled on an individual basis. All faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Accommodations:
Students with disabilities requesting accommodations should first register with the Disability Resources Center (352-392-8565; www.dso.ufl.edu/drc/). Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Please register as early as possible in the semester.
Online feedback:
Students are expected to provide feedback on the quality of instruction in this course by completing the online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

University of Florida Honor Code
UF students are bound by the Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to the appropriate personnel. The full student conduct and honor code is at https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

U Matter, We Care
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to many other helping resources including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.