

University of Florida
College of Public Health & Health Professions Syllabus
STA 6177 – Applied Survival Analysis (3 credits)

Fall: 2021

Delivery Format: *On-line*

Course Website: elearning.ufl.edu

Instructor Name: Arkaprava Roy, PhD
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Office Hours: Fridays 11:15-12:15pm and by appointment
Preferred Course Communications: Email or Canvas Message
TA : Dorothy Ellis

Prerequisites

Prior training in statistics (PHC 6052 or equivalent) and knowledge of multiple regression (PHC 6053 or equivalent). R programming experience will also be helpful.

PURPOSE AND OUTCOME

Course Overview

Survival analysis is about the analysis of time-to-event data. The goal of this course is to help you understand the fundamental concepts of survival analysis and their applications in epidemiology and biomedical sciences. Basic concepts from probability and introductory statistics will be reviewed as needed.

Relation to Program Outcomes

Survival analysis 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.

Course Objectives and/or Goals

Upon successful completion of the course, students should be able to:

1. Discuss the purpose and role of survival analysis in the field of Biostatistics
2. Utilize analytical methods to produce numerical and graphical summaries of time-to-event data
3. Conduct hypothesis testing to make inference on key survival analysis parameters
4. Formulate parametric and semi-parametric regression models for time-to-event data
5. Execute these functions in R software
6. Interpret results from studies in the literature that use survival analytic methods

Instructional Methods

Tuesday will be one period of lecture. Each lecture will review the material in that week's lecture notes. Students are expected to prepare by reading the lecture notes before class. Weekly quizzes due by 11.59 pm on Tuesday will be used to assess comprehension of the week's material.

Thursday will be a two period 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.

DESCRIPTION OF COURSE CONTENT

Topical Outline/Course Schedule

	Date(s)	Topic(s)
August	24	Lecture 1: <i>Introduction to time-to-event data</i>
	26	Problem Set 1
	31	Lecture 2: <i>Key functions in survival analysis</i>
September	2	Problem Set 2
	7	Lecture 3: <i>Parametric survival distributions</i>
	9	Problem Set 3
	14	Lecture 4: <i>Kaplan-Meier and Nelson-Aalen estimators</i>
	16	Problem Set 4
	21	Lecture 5: <i>Log-rank test</i>
	23	Problem Set 5
October	28	Midterm exam 1 review;
	5	Midterm exam distributed and due on the 7th
	12	Lecture 6: <i>Introduction to Cox proportional hazards regression</i>
	14	Problem Set 6
	19	Lecture 7: <i>Building Cox proportional hazards models</i>
	21	Problem Set 7
	26	Lecture 8: <i>Cox model extensions</i>
November	28	Problem Set 8
	2	Lecture 9: <i>Residuals and model diagnostics</i>
	4	Problem Set 9
	9	Midterm exam 2 review;
	11	Veteran's day- No class
	16	Midterm exam 2 distributed and due on the 18th
	23	Lecture 10: <i>Alternative data structures in survival analysis</i>
	23	Problem Set 10
	25	Thanksgiving – No class
	30	Lecture 11: <i>Accelerated failure time models</i>
December	7	Lecture 12: <i>Survival analysis in clinical trials</i>
	9	Problem Set 11/12
December	9	Final exam review, final exam distributed
	10	Reading day – No class
	15	Final exam distributed and due on the 16th

Course Materials and Technology

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

Good basic textbooks on survival analysis are: *Applied Survival Analysis, 2nd edition* by David W. Hosmer, Stanley Lemeshow, and Susanne May (Wiley-Interscience, 2008) and *Modelling Survival Data in Medical Research, 3rd edition* by David Collett (Chapman and Hall/CRC, 2014).

All statistical computing in the class will be done in R (<https://cran.r-project.org/>). The free Open Source Edition of RStudio (<https://www.rstudio.com/products/rstudio/>) is recommended for its easy to use graphical interface. 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")`.

For technical support for this class, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

ACADMIC REQUIREMENTS AND GRADING

Grading

The assessment will include class participation, two midterm exams, and one final exam. Students are responsible for all course material, including reading required materials prior to each class.

25% Weekly quizzes

25% Midterm exam 1 (due October 7)

25% Midterm exam 2 (due November 18)

25% Final exam (due December 16)

The point system used for this course consists of the standard scale:

Points Earned	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	Below 60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E

Quizzes (Weekly, Online)

Students are asked to review the lecture notes prior to attending class on Tuesday. There will be weekly quizzes to assess your comprehension of concepts and knowledge of requisite information needed to be successful in this course. The quizzes are in the Canvas course site and are directly related to each week's required readings. You will have 2 attempts to complete each quiz and the highest score will be recorded. Quizzes are due by 2pm on Tuesday providing the instructor time to review quiz results and address any common questions about the material in that day's lecture. These quizzes will help you evaluate your understanding of course content by providing you feedback on your performance.

Problem Sets

Problem sets will be given each Thursday unless there is an exam. These are to be completed together as part of small group activities. You should write up your own results for your records. They will not be graded, but they will important for learning the material and preparing for the exams. Solutions will be posted online.

Midterm Exams

There will be two midterm exams. The midterm exams will be take-home exams with open notes. Students will have 48 hours to complete the exam. Students will prepare neatly typed exams in Word or LaTeX that can be submitted online in Canvas. Exams are cumulative with greatest focus on material not covered in a previous exam.

Final Exam

The final exam will be a take-home exam. The exam will be cumulative with greatest focus on material not covered in previous exams. This exam will require some short answer and R computing. Students will prepare neatly typed exams in Word or LaTeX that can be submitted online in Canvas. Students are not allowed to work together on the final exam. Students will be asked to include an honor code statement at the beginning of their exam. Questions about the final exam should be directed to the instructor as early as possible, at least 24 hours before the exam is due.

Policy Related to Make-Up Exams

All students are expected to submit exams by the time communicated by the instructor. Make-up exams will not be considered except for an excused absence, per UF policy noted above. Students should contact the instructor as early as possible regarding a potential make-up exam.

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail me within 24 hours of the technical difficulty if you wish to request a make-up.

Bonus Points

In order to maintain high quality course materials, the instructor invites students to review the materials for errors. The instructor will award 0.5 bonus points for each "substantive" error found in the lecture notes, problem sets, solutions, or exams. Points will be applied to the next exam. Points will only be awarded to the first person to detect the error (who emails the instructor or notifies the instructor in class), and the error must be identified by the student before it is identified by the instructor.

The instructor reserves the right to determine what is "substantive." Examples include (i) improperly interpreted results (e.g. wrong effect size, wrong direction), (ii) incorrect calculations, derivations, or notation, (iii) text that is significantly misleading, and (iv) content that is obviously missing, such as through accidental deletion. Small typos, like a missed or incorrect word, are unlikely to be considered substantive errors.

STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

Expectations Regarding Course Behavior

Students are expected to show up for class prepared and on time. Cell phones are to be silenced during class unless there is an emergency, in which case please inform the instructor.

Communications Guidelines

Course discussions (online and in-class) should be respectful, thoughtful, and courteous. Please review and follow the UF *Netiquette Guidelines*:

<http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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.”

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. 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>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Professionalism and COVID

As students pursuing a path in the health professions or public health, it is crucial to demonstrate professional behaviors that reflect integrity and commitment to the health of patients, fellow health professionals, and to populations we serve. To accomplish this, a strong responsibility for the well-being of others must be evident in our decisions, along with accountability for our actions. Professionalism in the health disciplines requires adherence to high standards of conduct that begin long before graduation. This is particularly true during times of health emergencies such as the COVID pandemic, given our professional habits can have a direct impact upon the health of persons entrusted to us.

If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment:

<https://coronavirus.ufhealth.org/vaccinations/vaccine-availability/>. Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.

In response to COVID-19, the following professional practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to protect the health and safety of ourselves, our patients, our neighbors, and our loved ones.

- You are required to wear approved face coverings at all times while in Health Science Center classrooms and within Health Science Center buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.
- Continue to follow healthy habits, including best practices like frequent hand washing.
- Avoid crowded places (including gatherings/parties with more than 10 people)

Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class. Hand sanitizing stations will be located in every classroom.

Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.

Continue to regularly visit [coronavirus.UFHealth.org](https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) and coronavirus.ufl.edu for up-to-date information about COVID-19 and vaccination.

COVID-19 Symptoms

See <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html> for information about COVID-19 symptoms, which may include fever, cough, shortness of breath or difficulty breathing, fatigue, chills, muscle or body aches, headache, sore throat, congestion or runny nose, nausea or vomiting, diarrhea, and loss of taste or smell.

Recording Within the Course:

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Policy Related to Guests Attending Class:

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are not permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please review the Classroom Guests of Students policy in its entirety. Link to full policy: <http://facstaff.php.ufl.edu/services/resourceguide/getstarted.htm>

Online Faculty Course Evaluation Process

Students are expected to provide feedback on the quality of instruction in this course by completing 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/>.

Online Synchronous Sessions

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

SUPPORT SERVICES

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, it is strongly recommended you register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class or as soon as you believe you might be eligible for accommodations. The Dean of Students Office will provide documentation of accommodations to you, which you must then give to me as the instructor of the course to receive accommodations. Please do this as soon as possible after you receive the letter. Students with disabilities should follow this procedure as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. On line and in person assistance is available.
- You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>

- Crisis intervention is always available 24/7 from:
 - Alachua County Crisis Center: (352) 264-6789
 - <http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Inclusive Learning Environment

Public health and health professions are based on the belief in human dignity and on respect for the individual. As we share our personal beliefs inside or outside of the classroom, it is always with the understanding that we value and respect diversity of background, experience, and opinion, where every individual feels valued. We believe in, and promote, openness and tolerance of differences in ethnicity and culture, and we respect differing personal, spiritual, religious and political values. We further believe that celebrating such diversity enriches the quality of the educational experiences we provide our students and enhances our own personal and professional relationships. We embrace The University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office of Multicultural & Diversity Affairs website: www.multicultural.ufl.edu.