

## STA6177 Applied Survival Analysis (3 credit hours)

Fall 2023

Delivery Format: On-campus

Course Materials and Assignments: <http://elearning.ufl.edu/>

Instructor:	Dr. Jonathan Fischer
Class Meetings:	Mon 3-3:50 PM (HPNP G201) Wed 3-4:55 PM (HPNP G201)
Office Number:	CTRB 5223
Phone Number:	352-294-5459
Email Address:	<a href="mailto:jfischer1@ufl.edu">jfischer1@ufl.edu</a>
Office Hours:	Tue 1-3, Wed 12-2, or by appointment See Canvas page for sign-up sheet and Zoom link.
Teaching Assistant:	TBD ( <a href="mailto:TBD@ufl.edu">TBD@ufl.edu</a> )
Preferred Course Communications:	

- Ask about specific questions or issues of a personal nature by email through the Canvas inbox in E-learning.
- Ask more general questions (NOT personal or specific quiz questions) on the discussion board in E-learning.
- **NOTE: My email address is [jfischer1@ufl.edu](mailto:jfischer1@ufl.edu). There is another person with a nearly identical name and similar email address. Consequently, I prefer you use the Canvas inbox. However, if you need to email me directly, be sure to use the correct address as shown here. I typically respond to questions within one business day, so please verify that you used the correct address if you don't receive a response in that time.**

### Prerequisites

STA6327: Intro to Theoretical Statistics II or PHC6092: Intro to Biostatistical Theory or Consent of the instructor

### Purpose and Outcome

#### Course Overview

This course discusses "time to event" data, where the event can be response to treatment, relapse of disease, or death. This course will introduce the basic concepts and statistical methods used for survival data. Topics include censoring, Kaplan-Meier estimation, log-rank test, Cox proportional hazards regression model, accelerated failure time model and competing risks. Statistical analyses will be performed using R.

#### Relation to Program Outcomes

This course provides the knowledge to interpret and apply biostatistical methods needed to analyze time to event data.

#### Course Objectives and/or Goals

Upon successful completion of this course, students will be able to

1. Apply and interpret one sample methods for survival data including the Kaplan-Meier and Nelson-Aalen estimators.
2. Apply and interpret methods to compare two or more groups with a time to event response, including the log-rank test and weighted alternatives.
3. Apply, build and interpret regression models for survival data including the accelerated failure time model, Cox model and extensions.
4. Apply and interpret model diagnostics for regression models with survival data.

#### Instructional Methods

Weekly meeting will consist of a mix of lectures and problem-solving sessions where we work on the problem sets which comprise the weekly homework assignment.

## Description of Course Content

### Topical Outline

Week	Date(s)	Topic(s)	Assignments Due
1	8/21-8/25	Probability for Epidemiology	
2	8/28-9/1	Estimation of Probabilities in Epidemiology	8/29 - HW 1
3	9/4-9/8	Censoring, survival, and hazard functions. Failure time distributions	9/5 - HW 2
4	9/11-9/15	Kaplan-Meier and Nelson-Aalen estimators	9/12 - HW 3
5	9/18-9/22	Cohort studies, measures of association, and two-sample inference	9/19 - HW 4
6	9/25-9/29	Midterm 1	9/26 - HW 5
7	10/2-10/6	The log-rank test	10/3 - Exam 1
8	10/9-10/13	Semiparametric relative-risk regression: the Cox model	10/10 - HW 6
9	10/16-10/20	Correction for ties and baseline hazard estimation in the Cox regression model	10/17 - HW 7
10	10/23-10/27	Building and interpreting regression models	10/24 - HW 8
11	10/30-11/3	Residuals and goodness-of-fit for regression models	10/31 - HW 9
12	11/6-11/10	Midterm 2	11/7 - HW 10
13	11/13-11/17	Confounding and stratification: Mantel-Haenszel statistics and the stratified log-rank test	11/14 - Exam 2
14	11/20-11/24	Stratified Cox models, case-control studies, and conditional logistic regression (Thanksgiving)	11/21 - HW 11
15	11/27-12/1	Cox model extensions: Time-dependent covariates, recurrent events, and competing risks	
16	12/4-12/8	Review for final exam	12/5 - HW 12
Finals		Final exam	12/13 – Final exam

### 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/Rintro.pdf>). Many of the functions we use will be in the survival package (<https://cran.rproject.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](mailto:Learning-support@ufl.edu)
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

***E-learning***

An E-Learning site is available for the course (<http://elearning.ufl.edu>). The weekly schedule and all course materials are available online through this site including grades, assignments, discussions boards, and other course information. It is very important to check the weekly page and review all announcements carefully.

**Academic Requirements and Grading**

**Assignments**

Problem sets are due on **Tuesdays at 11:59 pm** and consist mostly of statistical analyses performed in R, though there are also written questions (especially early in the semester). As indicated above, we will set aside time to work on these assignments during our scheduled course meetings. There are three take-home exams (two midterms and one final).

**Grading**

Requirement	% of final grade
Problem sets (12)	30%
Midterm exams (2)	40%
Final exam (1)	30%

Points Earned	[93,100]	[90,93)	[87,90)	[83,87)	[80,83)	[77,80)	[73,77)	[70,73)	[67,70)	[63,67)	[60,63)	<60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0

Please be aware that a C- is not an acceptable grade for graduate students. The GPA for graduate students must be 3.0 based on 5000 level courses and above to graduate. A grade of C counts toward a graduate degree only if based on credits in courses numbered 5000 or higher that have been earned with a B+ or higher. More information on UF grading policy may be found at: <http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

**Policy Related to Make up Work**

**All work must be submitted via E-Learning by the exact due date and time.** Any late submission or missed work will receive a grade of ZERO unless arrangements have been made ahead of the due date with the instructor. Late submissions or make-ups are acceptable ONLY due to illness or other unanticipated circumstances warranting a medical excuse and resulting in the student missing an assignment deadline, consistent with College policy. Documentation from a health care provider is required. Please note: Any requests for make-ups due to technical issues MUST be accompanied by UF Computing help desk (<http://helpdesk.ufl.edu/>) correspondence. You MUST e-mail me within 24 hours if you wish to request a make-up.

**Policy Related to Required Class Attendance**

I don't plan on taking attendance, but it is strongly encouraged and will substantially reduce your workload. Please notify me of any problems or conflicts related to completing assignments as soon as possible. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**Student Expectations, Roles, and Opportunities for Input**

### Expectations Regarding Course Behavior

**It's critical to review the weekly page in Canvas and read all announcements carefully.** Each week's materials will be clearly identified on the course E-learning site. Students are expected to work through the material as scheduled. It is very important to work through all content contained on this site as directed and ask questions about the material you do not understand. **Working through the content from start to finish is the best approach to achieve a high level of understanding and success in this course.** In addition, it is your responsibility to review the comments and feedback we give on your graded assignments.

### Communication Guidelines

Questions about course material should be asked during office hours or posted on the course discussion boards in E-Learning. Questions about specific quiz questions or issues of a personal nature should be sent by email through E-Learning. For questions asked Monday-Thursday, we will try our best to respond within 24 hours. For questions asked Friday-Sunday, we will respond Monday or as soon as possible thereafter.

### 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.

### 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.

### **Online Faculty Course Evaluation Process**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## **SUPPORT SERVICES**

### **Accommodations for Students with Disabilities**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, 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](http://www.multicultural.ufl).



