

**University of Florida**  
**College of Public Health & Health Professions Syllabus**  
**STA6177: Applied Survival Analysis (3 credits)**

Fall: 2020

Delivery Format: T 9<sup>th</sup> period and R 8-9<sup>th</sup> Periods (over zoom) *Online Synchronous*  
Course Website: [elearning.ufl.edu](http://elearning.ufl.edu)

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Office Hours	: Fridays 10:00-11:00am and by appointment
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**Prerequisites:** STA 6327: Introduction to Theoretical Statistics II or PHC 6092: Introduction to Biostatistical Theory or Permission of the Instructor

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### **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 should 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:**

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 12pm 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.

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### **DESCRIPTION OF COURSE CONTENT**

## Topical Outline/Course Schedule

	Date(s)	Topic(s)	
September	1	Lecture 1: <i>Probability in Epidemiology</i>	
	3	Problem Set 1	
	8	Lecture 2: <i>Estimation of Probabilities in Epidemiology</i>	
	10	Problem Set 2	
September	15	Lecture 3: <i>Fundamentals Concepts of Survival Analysis</i>	
	17	Problem Set 3	
	22	Lecture 4: <i>Kaplan-Meier and Nelson-Aalen Estimators</i>	
	24	Problem Set 4	
	29	Lecture 5: <i>Accelerated Failure Time Models</i>	
October	1	Problem Set 5	
	6	Midterm exam 1 review; midterm exam 1 distributed	
	8	<b>Midterm exam 1 due 10/12 by Midnight</b>	
	13	Lecture 6: <i>Log-Rank Test</i>	
	15	Problem Set 6	
	20	Lecture 7: <i>The Cox Model</i>	
	22	Problem Set 7	
	27	Lecture 8: <i>Cox model (Conti)</i>	
	29	Problem Set 8	
	November	3	Lecture 9: <i>Building and Interpreting Regression Models</i>
		5	Problem Set 9
10		Lecture 10: <i>Regression Diagnostics Using Residuals</i>	
12		Problem Set 10	
17		Midterm exam 2 review; midterm exam 1 distributed	
19		<b>Midterm exam 2 due 11/23 by Midnight</b>	
24		Lecture 11: <i>Stratified Log-Rank Test</i>	
26	<b>Thanksgiving – No class</b>		
December	1	Lecture 12: <i>Stratified Cox Model and extensions</i>	
	3	Problem Set 11/12	
	8	Final exam review, final exam distributed	
December	10	<b>Reading day – No class</b>	
	15	<b>Final exam due at 12am</b>	

## 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, 2<sup>nd</sup> edition* by David W. Hosmer, Stanley Lemeshow, and Susanne May (Wiley-Interscience, 2008) and *Modelling Survival Data in Medical Research, 3<sup>rd</sup> 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](mailto:Learning-support@ufl.edu)
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

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## 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 12)

25% Midterm exam 2 (due November 23)

25% Final exam (due December 14)

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

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

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>

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.

### Exam Policy

Students may not share exams or exam solutions with anyone else at any time, even after the course is finished.

### Policy Related to Make up Exams or Other Work

In the event of unusual circumstances, a student could be given a make-up exam, or an incomplete grade in the course. The instructor must be notified by email about a request for a make-up exam as soon as possible.

Homework assignments must be submitted by 12 p.m. of the due date. Late assignments will not be accepted after the due date without an official excused absence.

Please note: Any requests for make-ups due to technical issues MUST be accompanied by the UF Computing help desk (<http://helpdesk.ufl.edu/>) correspondence. You MUST e-mail me within 24 hours of the technical difficulty if you wish to request a make-up.

### Policy Related to Required Class Attendance

Please note 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>

Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>). Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

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## **STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT**

### **Expectations Regarding Course Behavior**

All students are expected to remain actively engaged in lecture material and participate in class discussions. Out of respect for your peers, cell phones and off-topic use of laptops will not be tolerated. Not only will these distractions interfere with the student's ability to learn, but they will also interfere with the learning of their classmates.

### **Communications Guidelines**

When communicating with classmates or the instructor, especially when using email messages or Canvas discussions, please be courteous and respectful to avoid hindering the learning community established by the course. For information on netiquette guidelines, go to <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.

### **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/>.

### **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.

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## 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.

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## **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](http://www.multicultural.ufl.edu).