

THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF MATHEMATICAL SCIENCES

Course #: STAT 5393/ STAT 6393
(CRN: 25591/26132)
Course Title: Survival Analysis
Credit Hrs: 3
Term: Spring 2025 (Instruction 01/21/2025 - 05/08/2025)
Course Meetings & Location: 01:30pm – 02:50pm MW, Bell Hall 130A
Prerequisite Courses: Linear models and generalized linear models; Some programming experiences would be plus, though not required.
Instructor: Ritwik Bhattacharya
Office Location: Bell Hall 223
Contact Info: Phone: (915) 747-5761 [O]
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Fax: (915) 744-6502
Office Hours: 11am-1pm Weekdays via Zoom. Please email to make an appointment.
Class Web page: UTEP Blackboard Portal
Textbook(s), Materials: Required: Klein, J. P. and Moeschberger, M. L. (2003).
Survival Analysis - Techniques for Censored and Truncated Data. 2nd Edition. Springer.
Recommended: Therneau, T. M. and Grambsch, P. M. (2000).
Modeling Survival Data - Extending the Cox Model. Springer
Fleming, T. R. and Harrington, D. P. (2013).
Counting Processes and Survival Analysis, 2nd Edition. Wiley.
Course Description and Learning Outcomes: In generalized linear models, we have learned how logistic regression is used to analyze the prevalence rate of some interesting event such as death of a patient, failure of a machine, delinquency of a credit card holder, churn of a cell phone users, etc. Survival analysis provides further insight into the progression into this event of interest. Specifically, survival analysis is an important subfield of statistics which deals with analysis of time to event data. Survival analysis helps to address questions such as: what is the proportion of a population which will survive past a certain time? Of those that survive, at what rate will they die or fail? Can multiple causes of death or failure be taken into account? How do particular circumstances or characteristics increase or decrease the probability of survival? Censoring is the most important feature that characterizes and complicates survival analysis.

This course will provide a coverage of topics and methodologies common in survival analysis. Students will have opportunities to gain hands-on experiences with real-world data projects.

Topic Outline

1. **Introduction:** overview, survival data layout, notations, functions in survival analysis, censoring mechanisms (Chapters 1-3)
2. **Nonparametric survival curve estimates and inferences:** Kaplan-Meier estimator, Nelson-Aalen estimator. (Chapters 4-6)
3. **Two-sample test:** logrank, stratified logrank and trend tests (Chapter 7)
4. **The Cox proportional hazards model:** partial likelihood, Wald, score and likelihood ratio tests, Breslow estimator, stratification (Chapters 8-9)
5. **Cox regression model diagnostics:** residuals, functional forms, outlying and influential cases, checking the PH assumption, model validation (Chapter 11)
6. **Parametric regression models** (Chapter 12)
7. **Multivariate survival analysis:** marginal approach, frailty models, time-dependent covariates (Chapter 13)
8. A gentle intro to counting process and martingale based theories

Course

Activities/Assignments: Homework and small computer projects will be assigned throughout the semester. We will also have **one midterm exam** and a **comprehensive final exam**. Late coursework without justifiable reason will be penalized with point deduction at the rate of 10% for every 24 hours. Specifically, the maximum point is 90 for work that is late for 1-24 hours and 80 for work that is late for 25-48 hours and so on.

Course Schedule:	01/21	Class starts
	04/04	Class drop deadline
	05/08	Last day of classes
	05/12 - 05/16	Final Exam Period
	<u>Holidays</u>	
	03/10-03/14	Spring Break

Grading Policy: There will be several homework and small computer project assignments. However, those will not be graded. Nevertheless, you are encouraged to practice those regularly and independently. **Only one final computer project will be graded. The mid-term makes up 30%, the final exam 30%, and the computer project 40%.** No make-up exam will be given and no late project submission is accepted without justifiable reasons.

Grade Score

A	> 90
B	80-89
C	70-79
D	60-69
F	<60

Make-up Policy: There is NO make-up exam; if you must miss a midterm exam, e.g., with a university excuse or due to illness, the percentage of that exam will be re-distributed to other or future exams.

Incomplete grades are given only in extreme instances and only with prior permission of the instructor. All assigned projects must be turned in on time. No late coursework or project will be accepted, except extreme scenarios.

Attendance Policy: Class attendance is required. Students are expected to actively participate in class discussions and group activities. A late arrival of 15 minutes or more will be considered as an absence. Class attendance is **REQUIRED** and helpful to decide borderline grades. If a student must be absent from a particular class, he/she will be responsible for notifying the instructor and catching up with course material. **FOUR** or more unexcused absences will result in an instructor-initiated drop or grade failing / reduction. Your academic advisor will be consulted before final action is decided and taken. If you expect to miss **TEN** or more class hours for **ANY REASON**, please don't consider taking this course.

Academic Integrity Policy: The University policy is that all suspected cases or acts of alleged scholastic dishonesty must be referred to the Dean of Students for investigation and appropriate disposition. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Each student is responsible for notice of and compliance with the provisions of the Regents' Rules and Regulations, which are available for inspection electronically at <http://www.utsystem.edu/bor/rules/homepage.htm>

All students are expected and required to obey the law, to comply with the Regents' Rules and Regulations, with System and University rules, with directives issued by an administrative official in the course of his or her authorized duties, and to observe standards of conduct appropriate for the University. A student who enrolls at the University is charged with the obligation to conduct himself/herself in a manner compatible with the University's function as an educational institution.

Any student who engages in conduct that is prohibited by Regents' Rules and Regulations, U. T. System or University rules, specific instructions issued by an administrative official or by federal, state, or local laws is subject to discipline, whether such conduct takes place on or off campus or whether civil or criminal penalties are also imposed for such conduct.

Civility Statement: Calculators may not be shared during quizzes and exams. Please do not use cell phones, pagers, iPods, MP3 players, blue tooth devices, etc. during class or exam time. Cell phones and pagers should be set to silent or vibrate, and any calls should be taken outside of class. Please do not wear headsets or blue tooth devices during class. Please don't talk in class. Cell phone calculators may not be used on quizzes or exams. Active participation in class is expected, teamwork in class will be implemented.

Disability Statement: If a student has or suspects she/he has a disability and needs an accommodation, he/she should contact The Center for Accommodations and Support services (CASS) at 747-5148 or at <cass@utep.edu> or go to Room 106 Union East Building. The student is responsible for presenting to the instructor any CASS accommodation letters and instructions.

Military Statement: If you are a military student with the potential of being called to military service and/or training during the semester, please contact me by the end of the first week of class.

UTEP College of Science Policies: The UTEP Spring 2025 drop/withdraws deadline is April 4th, 2025. The College of Science will remain aligned with the University and not approve any drop requests after that date.

All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to month based upon completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab. If the student has missed a significant amount of work (e.g., multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted.