

MATH 659: Survival Analysis *Fall 2018 Graduate Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: Introduction to statistical methods for modeling time-to-event data in the presence of censoring and truncation, with emphasis on applications to the health sciences. Topics include survival and hazard functions, censoring and truncation, parametric and nonparametric models for survival data, competing-risks, regression models including Cox proportional hazards model and time-dependent covariates, one and two sample tests, and use of appropriate statistical software for computations.

Number of Credits: 3

Prerequisites: **MATH 665** or equivalent with Departmental approval.

Course-Section and Instructors

Course-Section	Instructor
Math 659-101	Professor W. Guo

Office Hours for All Math Instructors: [Fall 2018 Office Hours and Emails](#)

Required Textbooks:

Title	<i>Survival Analysis: Techniques for Censored and Truncated Data</i>
Author	John P. Klein and Melvin L. Moeschberger
Edition	2nd
Publisher	Springer
ISBN #	978-0387953991

Reference Books

- *Survival Analysis: A Self-Learning Text*, by David G. Kleinbaum and Michael Kline, 2nd edition (2005)
- *Applied Survival Analysis Using R*, by Dirk F. Moore (2016)
- *The Statistical Analysis of Failure Time Data*, by John D. Kalbfleisch and Ross L. Prentice, 2nd edition (2002).

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 12, 2018**. It will be

strictly enforced.

COURSE GOALS

Course Objectives: The course will acquaint students with various statistical techniques for analyzing censored survival or time-to-event data.

Course Outcomes

- On successful completion, a student will be able to demonstrate understanding and knowledge of the following:
- Various failure time distributions
- Likelihood construction for censored survival data
- Survival curves and their estimation from randomly censored data
- Exponential regression models
- The Cox regression model and the accelerated failure time model
- Statistical analysis such as estimation and hypothesis testing in the presence of censored data
- Application of the various survival analysis techniques

Course Assessment: Will be based on regular homework, one midterm exam and one final exam.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the [Department of Mathematical Sciences Course Policies](#), in addition to official [university-wide policies](#). DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Homework	25%
Project	20%
Midterm Exam	25%
Final Exam	30%

Your final letter grade will be based on the following tentative curve.

A	90 - 100	C+	75 - 80
B+	85 - 90	C	70 - 75
B	80 - 85	F	0 - 70

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the [Math Department's Attendance Policy](#). This policy will be strictly enforced.

Homework Policy: Homework assignments are due in a week from the day they are assigned unless announced otherwise by instructor. Late homework will not be accepted.

Exams: One in-class midterm examination and one final examination will be given as shown below.

Midterm Exam	October 23, 2018
Final Exam Period	December 15 - 21, 2018

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the [Math Department's Examination Policy](#). This policy will be strictly enforced.

Makeup Exam Policy: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Accommodation of Disabilities: Disability Support Services (DSS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services at [973-596-5417](tel:973-596-5417) or via email at lyles@njit.edu. The office is located in Fenster Hall, Room 260. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

Important Dates (See: [Fall 2018 Academic Calendar](#), [Registrar](#))

Date	Day	Event
September 4, 2018	T	First Day of Classes
September 10, 2018	M	Last Day to Add/Drop Classes
November 12, 2018	M	Last Day to Withdraw
November 20, 2018	T	Thursday Classes Meet
November 21, 2018	W	Friday Classes Meet
November 22 - 25, 2018	R - Su	Thanksgiving Recess
December 12, 2018	W	Last Day of Classes
December 13 & 14, 2018	R & F	Reading Days
December 15 - 21, 2018	Sa - F	Final Exam Period

Course Outline

Date	Lecture	Chapter	Topic	Assignment
WEEK 1 9/4	1	Sections 2.1-2.5	Introduction to Survival Analysis Basic Quantities of Survival Time Parametric Models for Survival Data	
WEEK 2 9/11	2	Section 2.6	Regression Models for Survival Data	Homework 1
		Sections 3.1-3.5	Censoring and Truncation	
WEEK 3 9/18	3	Sections 4.1-4.3	Nonparametric Estimation Methods (I)	

WEEK 4 9/25	4	Sections 4.4, 4.6, 5.2	Nonparametric Estimation Methods (II)	Homework 2
WEEK 5 10/2	5	Sections 7.1-7.2	Hypothesis Testing (I)	
WEEK 6 10/9	6	Sections 7.3-7.4	Hypothesis Testing (II)	Homework 3
WEEK 7 10/16	7	Sections 7.5, 8.1-8.3	Hypothesis Testing (III) Semiparametric Proportional hazards regression models and methods (I)	
WEEK 8 10/23			MIDTERM EXAM: TUESDAY - OCTOBER 23, 2018	
WEEK 9 10/30	8	Sections 8.4 -8.5	Semiparametric Proportional hazards regression models and methods (II)	Survival Data Analysis Project Homework 4
WEEK 10 11/6	9	Sections 8.7, 9.1	Semiparametric Proportional hazards regression models and methods (III) Refinements of the Semiparametric Proportional Hazards Model (I)	
WEEK 11 11/13	10	Sections 9.2-9.4	Refinements of the Semiparametric Proportional Hazards Model (II)	Homework 5
WEEK 12 11/20	11		NO CLASS - FOLLOW A THURSDAY SCHEDULE	
WEEK 13 11/27	12	Sections 12.1-12.3	Inference on Parametric Regression Models	Homework 6
WEEK 14 12/4	13	Sections 11.1-11.2, 11.4	Regression Diagnostics	
		Sections 10.1-10.2	Introduction to Additive Hazard Regression Models	
WEEK 15 12/11	14		Students' Project Presentation	
WEEK 16 12/18			FINAL EXAM: TUESDAY - DECEMBER 18, 2018	

*Updated by Professor W. Guo - 8/31/2018
Department of Mathematical Sciences Course Syllabus, Fall 2018*
