Course and Contact Information:
    Course: Department of Statistics, Survival Analysis, Stat6227
    Semester: Fall 2022
    Meeting Time: Mondays, 6:10pm-8:40pm
    Location: SMTH 120

Instructor:
    Name: Dr. Colin O. Wu
    Campus Address: Rome Hall, 801 22nd St. NW, Room
    Phone: 410-802-6491
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    Office Hours: Mondays, 5:00pm-6:00pm

    Teaching Assistant: Yu Xia
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Course Description:
Introduction to the theory and methods of survival analysis, including modeling time-to-event data, methods for the treatment of censoring (including the right/left censoring and double censoring), and the Cox proportional hazard models and their extensions

Course Prerequisite:
Basic knowledge of regression methods, statistical methods for estimation and inferences.
Course Homepage: http://blackboard.gwu.edu. Please check this page frequently.
Course Structure: The class consists of one lecture and some question/answer time per week. During the lectures, we will cover the basic formulations of statistical models for survival analysis, some theoretical background, and some real examples of survival analysis in biomedical studies. Commonly used statistical software packages, such as SAS and R will be introduced in the lectures and used for homework assignments and projects.

Learning Outcomes:
As a result of completing this course, students will have an overall background of the major theory and methods of survival analysis and their applications in practical settings. For students who are looking for a research topic in survival analysis, some recent research results and topics in the methods and applications of survival analysis will be beneficial.

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Required textbooks, materials, and recommended readings:

1) *Survival Analysis: Techniques for Censored and Truncated Data / Edition 2* (ISBN: 978038793991) by John P. Klein, Melvin L. Moeschberger, J.P. Klein, Alwyn B. Scott, Springer, New York

2) *Modelling Survivaldata in Medical Research, Second Edition* (ISBN: 1-58488-325-1) by David Collett, Chapman & Hall/CRC, Boca Raton.
3) *Modeling Survival Data, Extending the Cox Model* (ISBN: 0-387-98784-3) by Terry M. Therneau and Patricia M. Grambsch, Springer, New York.

Major Topics:
Nelson-Aalen estimators, Kaplan-Meier estimators, estimation of hazard functions, counting processes and martingales, modeling counting processes, the Cox proportional hazard models, estimation and inference methods for the Cox models, time-dependent covariates, residuals and model diagnosis, functional forms of the Cox models, goodness-of-fit tests for the Cox models, regression models for modeling multiple events, frailty models, and recent advances such as predictions, c-statistics, net reclassification index and joint models for survival data.

Average Minimum Amount of Out-Of-Class or Independent Learning Expected per Week:
Students are expected to spend a minimum of 2.5 hours of out-of-class work and a minimum of 5 hours of independent learning every week. In fact, for this course, it is expected that the independent learning outside of the classroom will exceed the minimum numbers of hours listed above.

Tentative Schedule (pending modification):

Date	Topics
August 29	Introduction to Survival Data
September 12	Survival Functions and Survival Data
September 19	Parametric Models for Survival Data
September 28	Likelihood Methods and Examples
October 3	One Sample Estimators: KM and NA Estimators
October 10	Proportional Hazards Models 1: Interpretation, Examples
October 17	Proportional Hazards Models 2: Estimation, Testing
October 31	Extensions of the Proportional Hazards Model
November 7	Introduction to Counting Processes
November 14	Parametric Regression Models
November 21	Life Table Analysis
November 28	Goodness-of-fit and Testing
December 5	Other Regression Models for Survival Data
December 12	Model Development: A Real Data Example

Homework: 8 homework/project assignments will be assigned.

You may discuss with me or with each other about the potential approaches for the homework for the purpose of improving your knowledge of the course material. But, you must solve the

problems by yourself and show the necessary steps of your solutions. Please submit the assignments on time and do not share assignments with students who are not taking the course.

Midterm: None.

Final Examination: One final take-home project covering all the topics discussed in the course.

Statistical Computing Packages: You will need to use a statistical package in order to perform some of the statistical analyses covered in this course. *We will focus on R.*

R is a freeware that we will use extensively in this course. A basic tutorial can be found at http://www.math.ilstu.edu/dhkim/Rstuff/Rtutor.html and a more advanced at http://zoonek2.free.fr/UNIX/48_R/all.html.

Course Grading: Homework/computing project (60%), Final (40%)

Important Notes:
- A grade of INCOMPLETE will ONLY be given to a student who is passing the course and cannot complete the course due to illness or other well documented circumstances beyond their control.
- Make-up exam is possible after obtaining the permission from Dr. Wu prior to the exam date.

NOTE: IN ACCORD WITH UNIVERSITY POLICY, THE FINAL EXAM WILL BE GIVEN DURING THE FINAL EXAM PERIOD AND NOT THE LAST WEEK OF THE SEMESTER

Academic Integrity:
I personally support the GW Code of Academic Integrity. It states:: "Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information." For the remainder of the code, see: http://www.gwu.edu/~ntegrity/code.html

Support for Students Outside the Classroom:
DISABILITY SUPPORT SERVICES (DSS)
Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/
UNIVERSITY COUNSELING CENTER (UCC) **202-994-5300**
The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:
crisis and emergency mental health consultations
confidential assessment, counseling services (individual and small group), and referrals
http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices

Safety and Security:
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.