



PubH 7450-001
Survival Data Analysis
Fall 2016

Credits: 3
Meeting Days: TU & TH
Meeting Time: 2:30pm-3:45pm
Meeting Place: Mayo 3-125
Course Website: <https://ay17.moodle.umn.edu/course/view.php?id=2127>
Instructor: Haitao Chu, MD, PhD
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Office Hours: 1:00pm-2:00pm TH with appointments
TA: Zhenxun Wang wang6795@umn.edu and Jin Jin <jinx493@umn.edu>
TA Office Address: Mayo Building A446
TA Office Hours: Monday 1:00pm to 2:00pm (JJ) and Wednesday 1:00pm to 2:00pm (ZW)

I. Course Description

This course deals with statistical methods analyzing data-to-event data. This is a more applied course, though both theoretical and applied materials will be covered. In particular, this is **not** a course only on how to run a SAS program and interpret its output; in addition, you also need to know underlying statistical procedures, including their modeling assumptions and possibly their derivations, from which, hopefully, you will learn to appreciate some general statistical principles. Both SAS and R will be used.

Acknowledgments

The contents of PubH 7450 have been developed with the contributions of numerous instructors. Former faculty/instructors, including Drs. Haitao Chu and Wei Pan, had roles in both the conceptual development and content of the current course, and are acknowledged for their contributions.

II. Course Prerequisites

Prerequisites: PubH 7405 (Linear Regression), PubH 7406 (Advanced Regression), Stat 5101-5102 (Theory of Statistics). Students are supposed to know concepts of distributions, statistical estimation and hypothesis

testing; linear regression; maximum likelihood theory, among others, and to have some experience in using the SAS and R.

III. Course Goals and Objectives

This course deals with methods analyzing survival times or time-to-event data, which may be censored and/or truncated. The main topics are: 1) estimating a survival curve; 2) comparing two (or more) survival curves; and 3) regression analysis.

IV. Methods of Instruction and Work Expectations

In-class lectures are the main method of instruction. There is a brief break during the 1 hour and 15 minutes class session. Students are expected to come to each class and encouraged to ask questions and participate in discussions in class, and read textbooks and finish assignments after class. Late assignment is not accepted unless with **in advance** permission from the instructor (see below) or with other legitimate reasons (such as illness).

V. Course Text and Readings: Reserved in the Bio-Medical Library (Diehl Hall) and probably in the Biostatistics Reading Room (A460)

- **REQUIRED:** J.P. Klein and M.L. Moeschberger, **Survival Analysis**, 2nd edition. Springer, 2003.
- Optional:
 - P.D. Allison, **Survival Analysis using the SAS System, A Practical Guide**, 2nd edition. SAS Institute Inc., 2010.
 - T.M. Therneau, P.M. Grambsch, **Modeling Survival Data**. Springer, 2000.

VI. Course Outline/Weekly Schedule

- Introduction to survival analysis: 1.5 weeks.
- Estimating a survival curve: 2 weeks.
- Comparing survival curves: 2 weeks.
- Proportional hazards regression: 4 weeks.
- Parametric regression models: 1 week.
- Multivariate survival analysis: 1 week.
- Other topics if time allows:

VII. Evaluation and Grading

- Homework assignments will involve some theoretical problems and running SAS or R programs to analyze data.
- I assume that everyone has working knowledge about using SAS and R. I will distribute and put relevant SAS or R programs of discussed examples in the course Moodle website. You are strongly encouraged to try these programs. Larger data sets for homework will be accessible from the course Moodle site, or from <http://www.mcw.edu/biostatistics/statisticalresources/Survival-Analysis-Book.htm> or in R package KMsurv.
- Please note that it is required to include in your write-up your SAS or R programs, only relevant parts of output, major steps of hand calculations, and necessary interpretations/conclusions.
- Students are allowed to discuss homework problems, however, each one is expected to program and write up independently; **Copying other's work, including computer programs, is cheating or plagiarism, which will lead to an automatic "F" and possible reporting to the University office.**
- **Each assignment is due at the beginning of class, typically one week after assigned. Hard copy is preferred. Email attachment is allowed if confirmed with instructor beforehand and sent to the instructor before the start of the class. Late homework is counted down 20% for each day of lateness, with the first 20% accruing to homework handed in after class on the due date.**

- With some legitimate reasons (e.g. illness with appropriate documents), you need to notify the instructor in advance or as early as possible to obtain my approval and thus receive no credit deduction.
- **There will be an in-class midterm exam in Week 8 (scheduled on Tuesday October 24, 2:30pm-3:45pm), and a final exam (scheduled on Saturday December 16 4:00-6:00 p.m.). An in-class exam will be closed book, but you can bring one page (for mid-term) or two pages (for final exam) of notes (8x11 in size, single sided). For either exam, you need to understand your course notes/textbooks (and homework problems). In particular, exam problems will not be only a subset of homework problems. If you cannot take the midterm exam for some legitimate reasons either unforeseen or with my approval in advance, there will be no make-up exam and your grade will be based on the final exam, suitably pro-rated.**
- **Course evaluation will be based on homework assignments, midterm exam and final exam with weights 40%, 20% and 40% respectively. The final grade is based on a weighted average score of a student's performance in the above three items.**
- S = Achievement that is satisfactory will be expected to complete all assignments and receive a minimum of 65% to receive a passing score.

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

A 4.000 - Represents achievement that is outstanding relative to the level necessary to meet course requirements

A- 3.667

B+ 3.333

B 3.000 - Represents achievement that is significantly above the level necessary to meet course requirements

B- 2.667

C+ 2.333

C 2.000 - Represents achievement that meets the course requirements in every respect

C- 1.667

D+ 1.333

D 1.000 - Represents achievement that is worthy of credit even though it fails to meet fully the course requirements

S Represents achievement that is satisfactory, which is equivalent to a C- or better.

For additional information, please refer to:

<http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html>.

Course Evaluation

The SPH will collect student course evaluations electronically using a software system called CoursEval: www.sph.umn.edu/courseval. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: www.sph.umn.edu/grades. All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

Incomplete Contracts

A grade of incomplete "I" shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an "I" requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and

instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the instructor, will specify the time and manner in which the student will complete course requirements. Extension for completion of the work will not exceed one year (or earlier if designated by the student's college). For more information and to initiate an incomplete contract, students should go to SPHGrades at: www.sph.umn.edu/grades.

University of Minnesota Uniform Grading and Transcript Policy - A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)

For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at onestop.umn.edu.

Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Office of Admissions and Student Resources at sph-ssc@umn.edu for further information.

Student Conduct Code

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see:

http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Scholastic Dishonesty

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code:

http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the

University. For additional information, please see:
<http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Makeup Work for Legitimate Absences

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:
<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

Appropriate Student Use of Class Notes and Course Materials

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:
<http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

Equity, Diversity, Equal Opportunity, and Affirmative Action

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Disability Accommodations

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, <https://diversity.umn.edu/disability/>.

Mental Health and Stress Management

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to

assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.

The Office of Student Affairs at the University of Minnesota

The Office for Student Affairs provides services, programs, and facilities that advance student success, inspire students to make life-long positive contributions to society, promote an inclusive environment, and enrich the University of Minnesota community.

Units within the Office for Student Affairs include, the Aurora Center for Advocacy & Education, Boynton Health Service, Central Career Initiatives (CCE, CDes, CFANS), Leadership Education and Development – Undergraduate Programs (LEAD-UP), the Office for Fraternity and Sorority Life, the Office for Student Conduct and Academic Integrity, the Office for Student Engagement, the Parent Program, Recreational Sports, Student and Community Relations, the Student Conflict Resolution Center, the Student Parent HELP Center, Student Unions & Activities, University Counseling & Consulting Services, and University Student Legal Service.

For more information, please see the Office of Student Affairs at <http://www.osa.umn.edu/index.html>.

Academic Freedom and Responsibility: for courses that do not involve students in research

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.