

# PUBH 7450, SECTION 001

## Survival Data Analysis Fall 2018

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### COURSE & CONTACT INFORMATION

**Credits:** 3

**Meeting Day(s):** TU & TH

**Meeting Time:** 2:30pm-3:45pm

**Meeting Place:** Moos Tower 2-520

**Instructor:** Haitao Chu, MD PhD

**Email:** [chux0051@umn.edu](mailto:chux0051@umn.edu)

**Office Phone:** 612-625-2138

**Fax:** 612-626-0660

**Office Hours:** 1:00pm-2:00pm TU with appointments

**Office Location:** Mayo Building A426

**TA: Souvik Seal ([sealx017@umn.edu](mailto:sealx017@umn.edu)) and Bin Guo ([guoxx617@umn.edu](mailto:guoxx617@umn.edu))**

**TA Office Address:** Mayo Building A446

**TA Office Hours:** Bin Guo (Mondays from 1:30-2:30pm); Souvik Seal (Thursday from 1:15-2:15pm)

### 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. Wei Pan and Xianghua Luo, had roles in both the conceptual development and content of the current course, and are acknowledged for their contributions.

### COURSE 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.

### COURSE GOALS & 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.

### METHODS OF INSTRUCTION AND WORK EXPECTATIONS

PUBH is a 3 credit course. The University expects that for each credit, you will spend a minimum of three hours per week attending class or comparable online activity, reading, studying, completing assignments, etc. over the course of a 15-week term. Thus, this course requires approximately 135 hours of effort spread over the course of the term in order to earn an average grade.

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).**

## Learning Community

School of Public Health courses ask students to discuss frameworks, theory, policy, and more, often in the context of past and current events and policy debates. Many of our courses also ask students to work in teams or discussion groups. We do not come to our courses with identical backgrounds and experiences and building on what we already know about collaborating, listening, and engaging is critical to successful professional, academic, and scientific engagement with topics.

In this course, students are expected to engage with each other in respectful and thoughtful ways.

In group discussion, this can mean:

- Respecting the identities and experiences of your classmates.
- Avoid broad statements and generalizations. Group discussions are another form of academic communication and responses to instructor questions in a group discussion are evaluated. Apply the same rigor to crafting discussion posts as you would for a paper.
- Consider your tone and language, especially when communicating in text format, as the lack of other cues can lead to misinterpretation.

Like other work in the course, all student to student communication is covered by the Student Conduct Code (<https://z.umn.edu/studentconduct>).

## COURSE TEXT & 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**, 2<sup>nd</sup> edition. SAS Institute Inc., 2010.
  - T.M. Therneau, P.M. Grambsch, **Modeling Survival Data**. Springer, 2000.

## 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: competing risk analysis and joint models

## SPH AND UNIVERSITY POLICIES & RESOURCES

The School of Public Health maintains up-to-date information about resources available to students, as well as formal course policies, on our website at [www.sph.umn.edu/student-policies/](http://www.sph.umn.edu/student-policies/). Students are expected to read and understand all policy information available at this link and are encouraged to make use of the resources available.

The University of Minnesota has official policies, including but not limited to the following:

- Grade definitions
- Scholastic dishonesty
- Makeup work for legitimate absences
- Student conduct code
- Sexual harassment, sexual assault, stalking and relationship violence
- Equity, diversity, equal employment opportunity, and affirmative action
- Disability services
- Academic freedom and responsibility

Resources available for students include:

- Confidential mental health services
- Disability accommodations
- Housing and financial instability resources
- Technology help
- Academic support

## EVALUATION & 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 Thursday October 18, 2:30pm-3:45pm), and a final exam (scheduled on Thursday December 20 10:30 a.m.-12:30 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.

### Grading Scale

The University uses plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following, and you can expect the grade lines to be drawn as follows:

% In Class	Grade	GPA
93 - 100%	A	4.000
90 - 92%	A-	3.667
87 - 89%	B+	3.333
83 - 86%	B	3.000
80 - 82%	B-	2.667
77 - 79%	C+	2.333
73 - 76%	C	2.000
70 - 72%	C-	1.667
67 - 69%	D+	1.333
63 - 66%	D	1.000
< 62%	F	

- A = achievement that is outstanding relative to the level necessary to meet course requirements.
- B = achievement that is significantly above the level necessary to meet course requirements.
- C = achievement that meets the course requirements in every respect.
- D = achievement that is worthy of credit even though it fails to meet fully the course requirements.

- F = failure because work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (Incomplete).
- S = achievement that is satisfactory, which is equivalent to a C- or better
- N = achievement that is not satisfactory and signifies that the work was either 1) completed but at a level that is not worthy of credit, or 2) not completed and there was no agreement between the instructor and student that the student would receive an I (Incomplete).

Evaluation/Grading Policy	Evaluation/Grading Policy Description
<b>Scholastic Dishonesty, Plagiarism, Cheating, etc.</b>	<p>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 (As defined in the Student Conduct Code). For additional information, please see <a href="https://z.umn.edu/dishonesty">https://z.umn.edu/dishonesty</a></p> <p>The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <a href="https://z.umn.edu/integrity">https://z.umn.edu/integrity</a>.</p> <p>If you have additional questions, please clarify with your instructor. 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.</p> <p>Indiana University offers a clear description of plagiarism and an online quiz to check your understanding (<a href="http://z.umn.edu/iuplagiarism">http://z.umn.edu/iuplagiarism</a>).</p>
<b>Late Assignments</b>	<ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ <b>Late assignment is not accepted unless with in advance permission from the instructor (see below) or with other legitimate reasons (such as illness).</b></li> <li>➤ <b>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.</b></li> </ul>
<b>Attendance Requirements</b>	<p>Students are generally required to attend lectures.</p>
<b>Extra Credit</b>	<p>Not available</p>