

## Term Information

Effective Term Spring 2018  
[Previous Value](#) Summer 2012

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

To update course description, learning objectives, prerequisite, and content topic list.

### What is the rationale for the proposed change(s)?

Course has been redesigned to eliminate redundancy with other courses. Prerequisite course sequence has also been redesigned, thus changing the appropriate prereq course.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

N/A

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area Statistics  
Fiscal Unit/Academic Org Statistics - D0694  
College/Academic Group Arts and Sciences  
Level/Career Graduate  
Course Number/Catalog 6605  
Course Title Applied Survival Analysis  
Transcript Abbreviation Appl Survival AnI  
Course Description Introduction to time-to-event data analysis. Topics include summary statistics, non-parametric methods, semiparametric and parametric models, and competing risks analysis. Focus is on analysis of health data using statistical software.  
[Previous Value](#) *Introduction to time-to-event data analysis. Kaplan-Meier estimation, log rank tests, proportional hazards regression analysis for censored or truncated data with extensions to time-dependent covariates and model building.*  
Semester Credit Hours/Units Fixed: 3

## Offering Information

Length Of Course 14 Week, 12 Week, 8 Week, 7 Week, 6 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Columbus

## Prerequisites and Exclusions

**Prerequisites/Corequisites**

6450 or 6950 or PubHBio 6211.

**[Previous Value](#)**

*Prereq: 6450 (645), 6950, PubHBio 6212, or 703, or permission of instructor.*

**Exclusions**

Not open to students with credit for 6605, Biostat 605, or PubHBio 7235.

## Cross-Listings

**Cross-Listings**

Cross-listed in PubHBio 7235.

## Subject/CIP Code

**Subject/CIP Code**

27.0501

**Subsidy Level**

Doctoral Course

**Intended Rank**

Masters, Doctoral

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

The course is an elective (for this or other units) or is a service course for other units

## Course Details

**Course goals or learning objectives/outcomes**

- Identify characteristics of time-to-event data that distinguish it from other types of measurements and how this impacts the analytical methods.
- Estimate summary measures for data in the presence of censoring and truncation.
- Obtain and interpret Kaplan-Meier and Nelson-Aalen estimators.
- Conduct and interpret nonparametric tests for comparing survival curves.
- Fit, using statistical software, semi-parametric and parametric models for survival data and interpret the output.
- Apply appropriate model building techniques to select and assess the fit of parametric and semi-parametric models for time-to-event data.
- Implement methods appropriate for survival data subject to non-proportional hazards, left truncation, interval censoring, and competing risks.

**[Previous Value](#)**

### Content Topic List

- Examples of Survival Data & Basic Concepts
- Censoring and Truncation & Likelihood Construction
- Kaplan-Meier and Nelson-Aalen Estimators
- Estimates of the Mean and Median Survival Time
- Tests for Two or More Samples
- Proportional Hazards Models with Fixed Covariates
- Proportional Hazards Models with Time-Dependent Covariates
- Stratified Proportional Hazards Models
- Regression Diagnostics
- Parametric Regression Models
- Analysis of Truncated and Interval Censored Data
- Analysis of Competing Risks Data
- Power and Sample Size Determination

### Previous Value

- *Examples of Survival Data & Basic Concepts*
- *Censoring and Truncation & Likelihood Construction*
- *Kaplan-Meier and Nelson-Aalen Estimators*
- *Estimates of the Mean and Median Survival Time*
- *Tests for Two or More Samples*
- *Censored Data*
- *Proportional Hazards Models with Fixed Covariates*
- *Proportional Hazards Models with Time-Dependent Covariates*
- *Stratified Proportional Hazards Models*
- *Regression Diagnostics*
- *Inference for Parametric Regression Models*

### Attachments

- STAT6605\_Sp17\_Syllabus\_newPrereqs.docx  
*(Syllabus. Owner: Lee, Yoonkyung)*
- PUBHBIO7235 Au14 rxs.pdf: old syllabus (Au14 offering)  
*(Syllabus. Owner: Lee, Yoonkyung)*

### Comments

- Could you please also upload the old syllabus so that the Panel can compare the old one to the new? *(by Vankeerbergen, Bernadette Chantal on 03/22/2017 01:47 PM)*
- 3/13/17: The Autumn deadline for course changes had been February 1st. Please change the effective terms to Spring 2018 or later. *(by Haddad, Deborah Moore on 03/14/2017 01:00 PM)*

**COURSE CHANGE REQUEST**  
6605 - Status: PENDING

Last Updated: Haddad,Deborah Moore  
03/23/2017

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Lee,Yoonkyung	03/14/2017 12:46 PM	Submitted for Approval
Approved	Lee,Yoonkyung	03/14/2017 12:46 PM	Unit Approval
Revision Requested	Haddad,Deborah Moore	03/14/2017 01:00 PM	College Approval
Submitted	Lee,Yoonkyung	03/14/2017 01:03 PM	Submitted for Approval
Approved	Lee,Yoonkyung	03/14/2017 01:03 PM	Unit Approval
Approved	Haddad,Deborah Moore	03/14/2017 01:04 PM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	03/22/2017 01:48 PM	ASCCAO Approval
Submitted	Lee,Yoonkyung	03/23/2017 06:08 PM	Submitted for Approval
Approved	Lee,Yoonkyung	03/23/2017 06:09 PM	Unit Approval
Approved	Haddad,Deborah Moore	03/23/2017 07:05 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler	03/23/2017 07:05 PM	ASCCAO Approval



**STAT 6605 (PUBHBIO 7235) – Applied Survival Analysis  
3 credit hours – Spring 2017**

**Instructor:** Michael Pennell, Ph.D.  
Office: 246 Cunz Hall  
Phone: 614-247-7936  
Email: pennell.28@osu.edu

**Office Hours:** Tuesday & Thursday after class until 3 pm, Cunz Hall Room 246

**Class Time:** Tuesday & Thursday 12:45-2:05pm, Jennings Hall Room 136

**Teaching Assistant:** Sara Conroy, [conroy.55@buckeyemail.osu.edu](mailto:conroy.55@buckeyemail.osu.edu), Office Hours: Wednesdays 10 am – 11 am, Cunz 230

**TA responsibilities:** The TA assigned to the course will hold regular office hours and lead review sessions for any students who need help with class material. The TA may assist with scoring homework and exams; however, final grades will be assigned by the professor. Any questions regarding grading should be directed to the professor and not the TA.

**Course Description:** Introduction to time-to-event data analysis. Topics include summary statistics, non-parametric methods, semiparametric and parametric models, and competing risks analysis. Focus is on analysis of health data using statistical software.

**Prerequisites:** PUBHBIO 6211 (PUBHBIO 702) or Stat 6450 (645) or Stat 6950, or permission of the instructor. Not open to students with credit for Stat 6605 (BioStat 605) or PUBHBIO 7235.

**Class format:** The course materials will be delivered through classroom lecturing.

**Class Policies:** The class will move quickly and cover a substantial amount of material; thus, attendance at each class is expected. Please read the relevant material in the textbook before each lecture. Homework and exams will be returned during the regular class time. It is the student's responsibility to show up for every class and pick up graded homework and exams.

**Carmen site:** Login at <http://carmen.osu.edu>. The site contains the syllabus, lecture notes, homework assignments and solutions, and course announcements.

**Primary Text:**

*Applied Survival Analysis*, 2<sup>nd</sup> edition, by Hosmer, Lemeshow and May (2008). Available online (for free) at: <http://proquest.safaribooksonline.com/9781118211588>

You must access the book online using a university computer or be logged-in to the library website if accessing remotely.

## Secondary Texts:

*Regression Methods in Biostatistics*, by Vittinghoff, Glidden, Shiboski and McCulloch (2012). Available free online at: <http://link.springer.com/book/10.1007/978-1-4614-1353-0>.

*Survival Analysis: Techniques for Censored and Truncated Data*, 2<sup>nd</sup> edition, by Klein & Moeschberger (2003). Available free online at: <http://web.a.ebscohost.com/ehost/detail/detail?sid=03573274-452a-4fe0-8f87-f8b34f3b285e%40sessionmgr4002&vid=0&hid=4204&bdata=JnNpdGU9ZWZWhvc3QtbGl2ZQ%3d%3d#AN=108043&db=nlebk>

*Survival Analysis: A Self-Learning Text*, by Kleinbaum and Klein (2005). Available free online at: <http://link.springer.com.proxy.lib.ohio-state.edu/book/10.1007%2F0-387-29150-4>

**Required Software:** STATA (<http://www.stata.com/>). STATA is available free of charge on the PCs in Cunz Hall computer labs (rooms 230 and 330). Students may choose to use other software packages, but examples will only be provided in STATA.

## Course Objectives:

Upon successful completion of the course, students will be able to:

1. Identify characteristics of time-to-event data that distinguishes it from other types of measurements and how this impacts the analytical methods.
2. Estimate summary measures for data in the presence of censoring and truncation.
3. Obtain and interpret Kaplan-Meier and Nelson-Aalen estimators.
4. Conduct and interpret nonparametric tests for comparing survival curves.
5. Fit, using statistical software, semi-parametric and parametric models for survival data and interpret the output.
6. Apply appropriate model building techniques to select and assess the fit of parametric and semi-parametric models for time-to-event data.
7. Implement methods appropriate for survival data subject to non-proportional hazards, left truncation, interval censoring, and competing risks.

## Core Competencies Covered:

- **Core MPH Competencies:**

1. Apply appropriate descriptive and inferential statistical techniques to public health data and interpret results of statistical analyses in the context of public health research and evaluation.
3. Apply epidemiologic principles to investigate the distribution of risk factors and disease in the population to improve public health.
6. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities.

- **Core MPH in Biostatistics Competencies:**

1. Critique scientific research articles and assess the appropriateness of statistical applications involved.
2. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.

3. Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences
  4. Apply appropriate statistical techniques for analyzing public health-related data with specific characteristics.
  6. Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
  7. Use standard statistical software for both data management and data analysis
- **Core MS Competencies:**
8. Read the scientific literature in the student's field and critique the methods and results.

**Grading:**

Final class grade will be determined as follows:

Homework	20%
Midterm Exams	50% (25% each)
Final Project	30%

**Grading Scale:\***

94 to 100: A	90 to < 94: A-	
87 to < 90: B+	84 to < 87: B	80 to < 84: B-
77 to < 80 C+	74 to < 77: C	70 to < 74: C-
60 to < 70 D	< 60: E	

\* The instructor reserves the right to adjust the grading scale if it appears necessary due to overall class performance. These adjustments will only raise a student grade, not lower it.

**Midterm Exams:**

There will be 2 in-class, closed book and closed notes Midterm Exams. You are allowed to bring ONE letter-size sheet of notes (both sides) to the first exam and TWO letter-size sheets of notes (both sides) to the second exam. **There will be no Final Exam in this class.**

Because exams are returned to students as quickly as possible, it is not possible for any student to take an exam late. Students who miss taking any exam will be penalized fully in the absence of a documented excuse. Similarly, the final exam must be taken at the time scheduled. Students with a problem taking an exam at the scheduled time must contact the instructor immediately upon discovery of the problem.

**Homework:**

There will be 5 homework assignments. Homework will include both hand-calculation and computer exercises. Late homework will not be accepted. You are permitted (indeed encouraged) to work together on homework, but **submitted assignments must be written independently**. Homework must be submitted in hard copy form to the instructor or his mailbox (Cunz 380) by 5:00 pm the day it is due. Emailed homework will not be accepted unless arranged in advance.

Clear and effective communication is crucial in statistical practice. This rule is applied to both homework

and exams. In any problem solving question it is the student's responsibility to make sure that he/she justifies his/her answer and provides enough detail for the grader to understand. Points will be deducted for answers that are not well-justified.

### **Final Project:**

Thirty percent of your grade will be determined by your performance on an applied data analysis project you will complete in groups assigned by the instructor. Your grade for the project will be based on an oral presentation given during the last two class sessions and a final paper. Instructions and guidelines for the project will be distributed within the first two weeks of the semester.

### **Office of Student Life: Disability Services**

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Student Life: Disability Services at 614-292-3307 in Room 098 Baker Hall 113 W. 12<sup>th</sup> Ave. to coordinate reasonable accommodations for students with documented disabilities (<http://www.ods.ohio-state.edu/>).

### **Mental Health Services**

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 or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

### **Academic integrity**

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (<http://oaa.osu.edu/coam/home.html>). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet



without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the *Student Handbook*. Ignorance of the *Code of Student Conduct* and the *Student Handbook* is never considered an “excuse” for academic misconduct.

If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University’s Committee on Academic Misconduct. If COAM determines that the student has violated the University’s *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

**Tentative Schedule:**

<b>Block</b>	<b>Lectures</b>	<b>Dates</b>	<b>Topics</b>	<b>Readings*</b>	<b>Homework</b>
<b>I</b>	1-2	1/10, 1/12	INTRODUCTION 1. Time-to-event data 2. Censoring/truncation 3. Univariable descriptive statistics	Ch 1-2	
<b>II</b>	2-5	1/17- 1/24	NON-PARAMETRIC METHODS 1. Kaplan-Meier 2. Key survival quantities 3. Comparisons/tests 4. Other approaches (Nelson-Aalen)	Ch 2	HW1 due Tues, 1/31
<b>III</b>	6-7	1/26, 1/31	INTRO TO REGRESSION MODELS 1. Hazard function 2. Semi-parametric models 3. Fitting the Cox model (partial likelihood) 4. Testing 5. Estimating survival functions	Ch 3	
<b>IV</b>	8-9	2/2, 2/7	COX MODEL INTERPRETATION 1. Continuous and Categorical Predictors 2. Confounding/interactions	Ch 4	HW 2 due Thurs, 2/9
<b>V</b>	10-11	2/9, 2/14	MODEL ASSESSMENT 1. Residuals 2. Proportional hazard assumption 3. Subject level diagnostics 4. Goodness-of-fit	Ch 6	
<b>VI</b>	12-13	2/16, 2/21	MODEL EXTENSIONS, PART I 1. Stratified model 2. Time-varying covariates	Ch 7.1-7.3 Vittinghoff, Ch 6.3	HW 3 due Thurs, 2/23

Block	Lectures	Dates	Topics	Readings*	Homework
	14	2/23	EXAM 1 REVIEW		
	15	2/28	EXAM 1		
<b>VII</b>	16-17	3/2, 3/7	MODEL DEVELOPMENT 1. Randomized Trial 2. Observational Study a.) Studies of a single predictor b.) Identifying predictors c.) Building a predictive model	Vittinghoff, Ch 10	
<b>VIII</b>	18-19	3/9, 3/21**	MODEL EXTENSIONS, PART II 1. Truncated Data 2. Left Censored Data 3. Interval Censored Data	Ch 7.4	HW 4 Due Thurs, 3/23
<b>IX</b>	20-21	3/23, 3/28	COMPETING RISKS ANALYSIS 1. Cumulative Incidence Function 2. Gray's Test 3. Cause-Specific Hazard Model 4. Fine-Gray Model	Ch 9.6, Vittinghoff Ch 6.5, Andersen <sup>†</sup>	
<b>X</b>	22-23	3/30, 4/4	PARAMETRIC MODELS 1. Exponential 2. Weibull 3. Log-logistic	Ch 8	HW 5 Due Thurs, 4/6
<b>XI</b>	24	4/6	SAMPLE SIZE AND POWER (+ Overview of Oral Presentations)	Ch 9.7	
	25	4/11	OVERVIEW OF FINAL PAPERS & EXAM 2 REVIEW		
	26	4/13	EXAM 2		
	27-28	4/18, 4/20	FINAL PROJECT PRESENTATIONS		
		<b>4/24</b>	<b>FINAL PAPER DUE BY 11:59 PM</b>		

\*Readings are from Hosmer, Lemeshow & May unless stated otherwise

\*\*No class on 3/14 and 3/16 for Spring Break

<sup>†</sup>Andersen et al. (2011). Competing risks in epidemiology: possibilities and pitfalls. *International Journal of Epidemiology* Vol 41, pp. 861-870. Available online: <http://ije.oxfordjournals.org/content/41/3/861>

**The Ohio State University College of Public Health**  
**PUBHBIO 7235 – Applied Survival Analysis**  
**3 credit hours – Autumn, 2014**

- Instructor:** Rod Sturdivant, Ph.D.  
Office: 248 Cunz Hall  
Phone: 614-247-8048  
Email: [Sturdivant.11@osu.edu](mailto:Sturdivant.11@osu.edu)
- Office Hours:** Tu/Th 2:15-3:15pm or by appointment
- Class Time:** Tuesday-Thursday 12:45-2:05pm; McPherson Lab 2019
- Teaching Assistant:** Wenna Xi    Email: [xi.34@buckeyemail.osu.edu](mailto:xi.34@buckeyemail.osu.edu)  
Office Hours: Tu/Th 11am-12    Location: Cunz Hall 280C
- Course Description:** An introduction to time-to-event data analysis. The primary focus will be how to analyze such data using methods available in standard statistical software packages. Topics include estimation of summary statistics, non-parametric methods – specifically Kaplan-Meier, and semi-parametric regression methods centered on the Cox model. The course will include analyzing real health science data using statistical software.
- Prerequisites:** PUBHBIO 6212 (PUBHBIO 703), Stat 6450 (645) or 6950, or permission of the instructor. Not open to students with credit for Stat 6605 (BioStat 605).
- Class format:** The course materials will be delivered through classroom lecturing.
- Class Policies:** The class will move quickly and cover a substantial amount of material; thus, attendance at each class is expected. Please read the relevant material in the textbook before each lecture. Homework and exams will be returned during the regular class time. It is the student's responsibility to show up for every class and pick up graded homework and exams.
- Carmen site:** Login at <http://carmen.osu.edu>. The site contains the syllabus, lecture notes, homework assignments and solutions, and course announcements.
- Required Text:** *Applied Survival Analysis*, 2<sup>nd</sup> edition, by Hosmer, Lemeshow and May (2008).
- Reference Texts:** *Regression Methods in Biostatistics*, by Vittinghoff, Glidden, Shiboski and McCulloch (2012)
- Survival Analysis: Techniques for Censored and Truncated Data*, 2<sup>nd</sup> edition, by Klein & Moeschberger (2003).
- The Statistical Analysis of Failure Time Data*, 2<sup>nd</sup> edition, by Kalbfleisch & Prentice (2002)
- Statistical Models and Methods for Lifetime data*, 2<sup>nd</sup> edition, by Lawless (2002).

**Required Software:**

STATA (<http://www.stata.com/>).  
STATA is available free of charge on the PCs in Cunz Hall computer labs (rooms 230 and 330). Students may choose to use other software packages, but examples will only be provided in STATA.

**Course Objectives:**

Upon successful completion of the course, students will be able to:

1. Identify characteristics of time-to-event data from other types of measurements and how this impacts the analytical methods.
2. Estimate summary measures for data in the presence of censoring and truncation.
3. Obtain and interpret Kaplan-Meier and Nelson-Aalen estimators.
4. Conduct and interpret nonparametric tests for comparing survival curves.
5. Fit, using statistical software, the proportional hazards model for survival data and interpret the output.
6. Apply appropriate model building techniques to select and assess the fit of semi-parametric models for time-to-event data.

**Core Competencies**

Core MPH Competencies

1. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
2. Apply descriptive and graphical techniques commonly used to summarize public health data.
3. Apply common statistical methods for inference and describe the assumptions required for each method.
4. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
5. Interpret results of statistical analyses found in public health studies.
6. Develop written presentations based on statistical analyses for both public health professionals and educated lay audiences.

Core MPH in Biostatistics Competencies

1. Read scientific research articles and assess the appropriateness of statistical applications involved.
2. Conduct statistical procedures and data analysis methods appropriate for analyzing data obtained from health-related research studies.
3. Make statistical inferences and prepare reports to communicate them, with limited supervision.
4. Apply appropriate statistical techniques for analyzing public health-related data with specific characteristics, including continuous, and time-to-event data.
5. Have hands-on experience with one major statistical data analysis package (STATA).

**Grading:** Final class grade will be determined as follows:

Homework	50%
Midterm Exam	20%
Final Exam	30%

Grading Scale:\*

93-100 A	90-93 A-		
87-90 B+	83-87 B	80-83 B-	
77-80 C+	73-77 C	70-73 C-	
60-70 D	≤ 59 E		

\* The instructor reserves the right to adjust the grading scale if it appears necessary due to overall class performance. These adjustments will only raise a student grade, not lower it.

**Exams:** There will be 2 in-class, closed book and closed notes exams. You are allowed to bring ONE letter-size sheet of notes (both sides) to the midterm exam and TWO letter-size sheets of notes (both sides) to the final exam.

Because exams are returned to students as quickly as possible, it is not possible for any student to take an exam late. Students who miss taking any exam will be penalized fully in the absence of a documented excuse. Similarly, the final exam must be taken at the time scheduled. Students with a problem taking an exam at the scheduled time must contact the instructor immediately upon discovery of the problem.

**Assignments:** There will approximately seven homework assignments. Homework will include both hand-calculation and computer exercises. Late homework will not be accepted.

You are permitted (indeed encouraged) to work together on homework, but **submitted assignments must be written independently.**

You may submit your homework via Carmen dropbox, email or in hard copy. Homework is due by midnight on the due date. All homework assignments must be submitted to the Carmen dropbox as a single file. Do not separate problems as single files, and don't put single STATA graphs into the drop box. Copy and paste output from STATA code and output into your homework as a single file, annotate the output when necessary, name the file with homework number, and submit it. Be sure to include your name on the first page of your homework. If you have to, use a scanner to create the file. Scanned documents containing a mix of hand-written, typed and/or pasted computer output are fine.

Clear and effective communication is crucial in statistical practice. This rule is applied to both homework and exams. In any problem solving question it is the student's responsibility to make sure that he/she justifies his/her answer and provides enough detail for the grader to understand. Points will be deducted for answers that are not well-justified.

**Office for Disability Services:**

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office for Disability Services at 614-292-3307 in room 150 Pomerene Hall to coordinate reasonable accommodations for students with documented disabilities.

**Student Assistance:**

Personal, social and academic wellness services are provided by the Younkin Success Center at OSU. Please connect to <http://younkinsuccess.osu.edu/wellness-services/> for details regarding counseling services intended to help students manage stress and anxiety as well as tutoring and learning services to assist with developing improved study/course skills and time management.

**Academic integrity:**

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the School of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (<http://oaa.osu.edu/coam.html>). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

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If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

**Tentative Schedule:** *Subject to change*

<b>Block</b>	<b>Lectures</b>	<b>Topics</b>	<b>Readings*</b>	<b>Homework</b>
<b>I</b>	1-2	INTRODUCTION 1. Time-to-event data 2. Censoring/truncation 3. Univariable descriptive statistics	Ch 1-2	
<b>II</b>	2-5	NON-PARAMETRIC METHODS 1. Kaplan-Meier 2. Key survival quantities 3. Comparisons/tests 4. Other approaches (Nelson-Aalen)	Ch 2	HW1 due Monday September 15
<b>III</b>	6-8	INTRO TO REGRESSION MODELS 1. Hazard function 2. Semi-parametric models 3. Fitting the Cox model (partial likelihood) 4. Testing 5. Estimating survival functions	Ch 3	HW2 due Wednesday September 24
<b>IV</b>	9-11	COX MODEL INTERPRETATION 1. Interpreting the fitted model 2. Multivariable models 3. Confounding/interactions	Ch 4	HW3 due Friday October 3
	12	<b>MIDTERM EXAM</b>		Tentative: Tuesday, Oct 7
<b>V</b>	13-17	MODEL DEVELOPMENT 1. Purposeful model building 2. Checking scale 3. Stepwise selection 4. Best subsets 5. Issues	Ch 5	HW4 due Monday October 20
<b>VI</b>	18-21	MODEL ASSESSMENT 1. Residuals 2. Proportional hazard assumption 3. Subject level diagnostics 4. Final model presentation	Ch 6	HW5 due Monday November 3
<b>VII</b>	22-25	MODEL EXTENSIONS 1. Stratified model 2. Time-varying covariates 3. Other censoring types	Ch 7	HW6 due Monday November 17
<b>VIII</b>	26-28	ADDITIONAL TOPICS (time permitting) Possible: parametric models, competing risk, frailty, sample size	TBD	HW7 due Monday December 8

\*All readings are from Hosmer, Lemeshow & May