Term Information

Effective Term	Autumn 2015

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	7605
Course Title	Advanced Regression Modeling of Time-to-Event Data
Transcript Abbreviation	Regr Time To Event
Course Description	Advanced topics in survival analysis. Proportional hazards models, parametric regression models, length-bias and prevalent sampling, multivariate survival analysis, counting processes, recurrent events.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 7 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	Prereq: Stat 6802 (622) and 6950.
Exclusions	Not open to students with credit for PUBHBIO 706 or PUBHBIO 8235.

Cross-Listings

Cross-Listings	PUBHBIO 8235

Subject/CIP Code

Subject/CIP Code	27.0501
Subsidy Level	Doctoral Course
Intended Rank	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

- Perform (Cox) proportional hazards regression modeling
- Explain time-dependent covariates
- Test the proportional hazards assumption
- Identify parametric models for survival data
- Distinguish when to use competing risks and cumulative incidence functions
- Use and apply additive regression models
- Explain multivariate survival analysis

Content Topic List

- Proportional Hazard Model
- Estimation of the Survival Function for Left, Double, and Interval Censoring
- Inference for Parametric Regression Models
- Length-bias and Prevalent Sampling
- Multivariate Survival Analysis
- Counting Processes
- Recurrent Event Models

Attachments

- STAT7605_PUBHBIO8235_Syllabus.pdf: Syllabus

  (Syllabus. Owner: Craigmile,Peter F)

- Justification for Mismatched Course Numbers.pdf: Justification for difference in numbering schemes

  (Other Supporting Documentation. Owner: Craigmile,Peter F)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Craigmile,Peter F	12/08/2014 08:07 AM	Submitted for Approval
Approved	Craigmile,Peter F	12/09/2014 11:49 AM	Unit Approval
Approved	Fink,Steven Scott	12/10/2014 04:20 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	12/10/2014 04:20 PM	ASCCAO Approval

STAT 7605 / PUBHBIO 8235
Regression Modeling of Time-to-Event Data

Instructor: TBA

Office Hours: TBA

Lectures: Three 55 minute lectures per week.

Teaching Assistant: TBA

Course Webpage: Carmen: http://carmen.osu.edu
Login with your OSU internet username (name.#) and password

Required Text: *The Statistical Analysis of Failure Time Data*, 2nd edition, by Kalbfleisch & Prentice (2002)

Reference Texts: *Applied Survival Analysis*, 2nd edition, by Hosmer, Lemeshow and May (2008).

Statistical Models and Methods for Lifetime data, 2nd edition, by Lawless (2002).

Survival Analysis: Techniques for Censored and Truncated Data, 2nd edition, by Klein & Moeschberger (2003).

Required Software: Stata (http://www.stata.com/)
STATA is available free of charge on the PCs in the Cunz Hall computer labs.
R (http://www.r-project.org/)
R is available free of charge online.

Course Description: Statistical models and methods useful for analyzing both univariate and multivariate failure time data are discussed. Topics beyond applied survival analysis may include length-bias, prevalence sampling, martingale and asymptotic theory, and recurrent event processes. Emphasis will be on nonparametric and semiparametric approaches for modeling, estimation and inference although parametric methods will be shown.

Exams: There will be one in-class midterm exam. The exam will be closed book with THREE letter-size sheet of notes (both sides) allowed as reference.

Homework: There will be four to six homework assignments. Late homework will not be accepted without advance notice. **You are permitted (and encouraged!) to work together on homework, but submitted assignments must be written independently.** Homework should be submitted in hard copy with email only used in an emergency. Homework is due by midnight on the due date.

Project: Each student will individually give an in-class presentation (roughly 15 minutes) at the end of the semester. Additionally, a short report (8-10 pages) on the topic

of the presentation is required as part of the project. Topic ideas and further project guidance will be provided early in the semester.

Grading: Final class grade will be determined as follows:

Homework	40%
Midterm Exam	30%
Final Project	30%

Grading Scale:* 100-94 A
93-90 A-
89-87 B+
86-84 B
83-80 B-
79-77 C+
76-74 C
73-70 C-
69-60 D
59 or lower E
* The instructor reserves the right to adjust the grading scale if it appears necessary due to class performance. These adjustments will only raise a student's grade not lower it.

Tentative Schedule: *Subject to change*

Block	Lectures*	Topics	Textbook
1	1-3	Review of Applied Survival Analysis Censoring/truncation Non-parametric estimators Comparison of survival functions Introduction to counting approach	Chapter 1
2	4-6	Parametric Models	Chapters 2, 3
3	7-12	Semi-parametric Models	Chapters 4, 6
4	13-15	Counting processes and Asymptotic Theory	Chapters 5
5	17-18	Accelerated Failure Time Model	Chapter 7
6	19-20	Competing Risk Models	Chapter 8
7	21-22	Recurrent Event Data	Chapter 9
8	23-24	Multivariate Data	Chapter 10
10	25-29	Additional topics: sample size, truncation models etc	N/A
11	30-31	Student presentations	N/A

*** Likely to change depending on course flow; midterm tentatively at lecture 16 (3 October)**

Learning Objectives:
Upon successful completion of the course, students will have the knowledge, comprehension and/or skills to be able to use and apply commonly used statistical methods for analyzing univariate and multivariate failure time data. In particular, students will be able to:

1. Construct appropriate models time to event data using parametric, non-parametric or semi-parametric models and both provide interpretation results and verify model assumptions;
2. Explain basic features of counting processes and apply them to obtain asymptotic results for failure time models;
3. Formulate expressions to estimate parameters using likelihood theory for failure time models;
4. Construct models and expressions for parameter estimations for more advanced time-to-event data situations to include bivariate/multivariate survival and recurrent event data;
5. Research and present results, both orally and in writing, for an advanced topic in the field of survival analysis not covered in the course.

Core Competencies

- **Core MPH Competencies:**

    1. Describe the role biostatistics serves in the discipline of public health.
    2. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
    3. Apply descriptive and graphical techniques commonly used to summarize public health data.
    4. Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
    5. Apply common statistical methods for inference and describe the assumptions required for each method.
    6. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
    7. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
    8. Interpret results of statistical analyses found in public health studies.
    9. Develop written and oral presentations based on statistical analyses.

- **Core MPH in Biostatistics Competencies:**

    1. Conduct statistical procedures and data analysis methods appropriate for analyzing data obtained from health-related research studies.
    2. Apply appropriate statistical techniques for analyzing public health-related data with specific characteristics, including: continuous and categorical data.
    3. Have hands-on experience with one major statistical data analysis package (STATA).

- **Core MS Competencies:**

    1. Read the scientific literature in the students field and critique the methods and results.
    2. Conduct a brief literature review to evaluate the state of the science regarding a specific topic in the students area of interest.

- **Core PhD Competencies:**

1. Conduct a thorough literature review to summarize and evaluate the state of the science regarding a new topic in the students general area.
2. Outline a study to address one of those questions using the appropriate research design.
3. Prepare and deliver lectures or other appropriate class sessions in the students area of expertise.
4. Demonstrate advanced knowledge in at least one area of subspecialty within the discipline of specialization.

Office of 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.

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/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.

Justification for Mismatched Course Numbers (PUBHBIO and STAT) for Cross-Listed Courses

Justification for 7000/8000 Mismatch:

This cross-listed course is given a different course level designation and number in PUBHBIO and STAT. In the College of Public Health, courses at the 6000 level are foundational level graduate courses taken by all Public Health graduate students as their first PUBHBIO courses, which means that there is a mismatch in higher level courses relative to Statistics offering. In addition, CPH policy is for the second digit to reflect the Division, in this case "2" for Biostatistics. In the Statistics Department, all intermediate level graduate electives are 7000 level courses, numbered 75XX or 76XX. It would not make sense to violate or compromise the internal logic and coherence of one department's numbering system simply to give a single cross-listed course the same number across units.