THE UNIVERSITY OF ARIZONA
Mel & Enid Zuckerman College of Public Health

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University of Arizona

BIOS 686 Survival Analysis

Catalog Description: This course introduces basic concepts and methods for analyzing survival time data obtained from following individuals until occurrence of an event or their loss to follow up. We will begin this course from describing the characteristics of survival data and building the link between distribution, survival and hazard functions. After that we will cover non-parametric, semi-parametric and parametric models and two-sample test techniques. In addition we will also demonstrate mathematical and graphical methods for evaluation goodness of fit and introduce the concept of dependent censoring/competing risk. During the class students will also learn how to use a computer package, SAS, Splus or Stata to analyze survival data. (3 units)

Course Topics:

- Survival Data and Survival Functions
- Confidence Interval for Survival Function
- Hypothesis Testing
- Proportional Hazards (PH) Model
- Additive Hazards Regression Models
- Parametric Survival Models
- Recurrent Events

Course Objectives: During this course, students will:

- Recognize the characteristics of survival data, e.g. censoring and truncation.
- Determine the proper method to be used in analyzing time-to-event data (e.g., parametric, semi-parametric or non-parametric method).
- Understand the assumptions for the method chosen to analyze the data.
- Apply mathematical and graphical methods to check goodness of fit.
- Perform survival analysis using a computer statistical software package.
- Interpret computer outputs.
- Assess the quality of survival analysis conducted in published research papers.

Learning Outcomes (Competencies Obtained): Upon completion of this course students will be able to:

1. Select appropriate research designs to meet the needs of various studies, and be able to explain the limitations of implemented designs
2. Identify appropriate statistical tools to address specific scientific questions
3. Demonstrate excellent presentation skills and the ability to explain statistical concepts and findings to a general scientific audience
4. Demonstrate skills in data management to handle a variety of practical problems in data format and structure
5. Demonstrate advanced working skills in application of computer systems and appropriate statistical software
6. Demonstrate understanding of basic concepts of probability, random variation and commonly used statistical probability distributions
7. Demonstrate the ability to skillfully engage in statistical collaboration with mentors, colleagues, and

clients

8. Recognize strengths and weaknesses of proposed statistical approaches, including alternative designs, data sources, and analytical methods

9. Suggest preferred methodological alternatives to commonly used statistical methods when assumptions are not met
10. Demonstrate advanced competencies in areas of professional expertise and scholarship enabling advancement to further postgraduate study in statistics or biostatistics
11. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question
12. Communicate understanding of the assumptions necessary for a given statistical procedure as well as the ability to determine if the assumptions are met for a given study design or data set
13. Demonstrate the ability to identify, articulate and implement sound study design, methodological and computational strategies for addressing scientific questions
14. Demonstrate the ability to communicate effectively in writing reports, giving oral presentations, and teaching basic statistical material in a formal classroom or seminar setting
15. Demonstrate the use of statistical theory necessary for the development and study of new statistical methods or to adapt existing methods to new or unique problems