HLT 550 Statistical Modelling for Public Health

Winter 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email: TBA

COURSE OBJECTIVES

This course provides a comprehensive introduction to statistical modeling techniques in the context of health data analysis. The focus is on extending their knowledge and practical skills through the introduction of statistical modeling principles and practices. The course will cover three main types of models – linear, logistic, and survival models. Emphasis will be placed on understanding the unique features and similarities among these models, while also addressing good practices in diagnostic model checking, variable selection, and model building. These general topics are applicable to any type of model fitting process, providing students with a robust foundation for statistical modeling in public health.

Upon Completion of this Course, students will be able to:

1. Understand the fundamentals of statistical modeling in the context of health data analysis;

2. Apply linear models to analyze relationships between variables in medical and health research;

3. Utilize logistic models to assess categorical outcomes and their associations in health-related studies;

4. Apply survival models to analyze time-to-event data commonly encountered in medical research;

5. Demonstrate proficiency in the process of model building, considering practical aspects and general principles.

6. Enhance critical thinking skills in evaluating and interpreting results from different types of statistical models.

PREREQUISITES

BIO 352 Biomechanics

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
4 Assignments	20 Points
2 Quizzes	20 Points
Midterm Exam	25 Points
Final Exam	35 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Agresti, A. (2018). *Statistical methods for the social sciences*. Pearson.

Scott, I., & Mazhindu, D. (2014). *Statistics for healthcare professionals: An introduction.* Sage.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS

Module 1	**Topics:** Topic 1: Introduction to statistical modeling in public health Topic 2: Introduction to R and Latex Topic 3: Conditional Probability Topic 4: Expectation and Variance **Assessments:** Assignment #1
Module 2	**Topics:** Topic 5: Distributions and central limit theorem Topic 6: Concepts of statistical inference Topic 7: Frequentist behavior Topic 8: Hypothesis testing **Assessments:** Assignment #2 Quiz #1
Module 3	**Topics:** Topic 9: Power and multiple testing Topic 10: FDR and two group tests Topic 11: Principles of linear models in public health Topic 12: Diagnostic model checking for linear models **Assessments:** Assignment #3 Midterm Exam
Module 4	**Topics:** Topic 13: Introduction to logistic regression models in public health Topic 14: Variable selection strategies for logistic models Topic 15: Fundamentals of survival analysis in the context of public health Topic 16: Model building and selection for survival models **Assessments:** Assignment #4 Quiz #2
Module 5	**Topics:** Topic 17: Effective strategies for variable selection Topic 18: Principles of model building for different types of models Topic 19: Practical exercises in variable selection and model building Topic 20: Application of statistical modeling techniques to real-world public health scenarios **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.

2) Assignments submitted in the wrong format will be counted as not submitted.

3) Failure to submit or fulfill any required course component results in failure of the class.

4) Make-up for midterm and final exams only with valid excuses, as defined by the University.

5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.