



BIO 346 Biostatistics and Design of experiments

Winter 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

Biostatistics is the application of statistics to different topics in biology including medicine, pharmacy, public health science, agriculture and fishery. It involves the analysis of data from experiments; its interpretation and drawing conclusion from the results. The objective of this course is to foster comprehension and admiration for the significance of experimentation, hypothesis testing, and data analysis in the realm of sciences. The emphasis will be on fundamental aspects such as experimental design principles, methods for data collection, exploratory data analysis, and the application of graphical and statistical tools commonly employed by scientists for data analysis.

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

1. Demonstrate a solid understanding of fundamental biostatistical concepts, including descriptive statistics, probability, and probability distributions in the context of biological research;
2. Apply hypothesis testing and construct confidence intervals to make inferences about population parameters in biological studies;
3. Analyze and interpret factorial experiments, understanding the significance of interactions and main effects in biological research;
4. Apply regression analysis to model relationships between variables in biological data, interpreting results and assessing model validity.

PREREQUISITES

STA 203 Introductory Statistics for Scientists



GRADING

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

ITEM	POINTS
2 Assignments	10 Points
2 Quizzes	20 Points
6 Lab Reports	30 Points
Midterm Exam	15 Points
Final Exam	25 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:

The analysis of biological data by Michael Whitlock and Dolph Schluter. Roberts and Company Publishers.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Introduction to the course Topic 2: Statistics and samples Topic 3: Types of data and variables Topic 4: Types of studies Assessments: Lab #1



	Report #1 Assignment #1
Module 2	<p>Topics: Topic 5: Frequency distributions Topic 6: Categorical variables/Numerical variables Topic 7: Measures of center and variability Topic 8: Proportions</p> <p>Assessments: Lab #2 Report #2 Quiz #1</p>
Module 3	<p>Topics: Topic 9: Estimating with uncertainty Topic 10: Probability Topic 11: Hypothesis testing Topic 12: Hypothesis testing and confidence intervals</p> <p>Assessments: Lab #3 Report #3 Midterm Exam</p>
Module 4	<p>Topics: Topic 13: The binomial distribution/The binomial test Topic 14: Fitting probability models to frequency data Topic 15: Contingency analysis Topic 16: The normal distribution</p> <p>Assessments: Lab #4 Report #4 Assignment #2</p>
Module 5	<p>Topics: Topic 17: Inference for a normal population Topic 18: Comparing two means Topic 19: Handling violations of assumptions Topic 20: Designing experiments</p> <p>Assessments: Lab #5 Report #5 Quiz #2</p>



Module 6	<p>Topics: Topic 21: Analysis of variance Topic 22: Correlation between numerical variables Topic 23: Linear regression Topic 24: General linear models</p> <p>Assessments: Lab #6 Report #6 Final Exam</p>
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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.



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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).

ACADEMIC 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.