

STATISTICS 271 / MATH 271

1. Teaching Staff.

Instructor & Teaching Assistants:

Instructor: **Assc. Prof. Halil Bayraktar**
(hbayraktar@itu.edu.tr)

Office: MOBGAM-308

Office Hours: Thursday - 14:30 - 15:00 pm and by appointment.

Course Website: <https://b2lab.wordpress.com/biostatistics/>

2. Course Format and Goals.

i) What are the course objectives?

This is an introductory statistics course for molecular biology and genetics students. You will understand the use of statistical methods for solving and understanding life science, biology, health and genetics problems.

Upon successful completion of this course, you will have a sufficient knowledge for probability principles and applying them to statistical inference.

Besides we hope that you will analyze and apply different statistical models to solve complex biological problems. We would like to see you using the fundamental basic concepts of statistics and probability for explaining measurements.

ii) Synopsis

This course introduces key concepts in statistics and probability. Topics in data types and visualization, linear regression, statistics, random variables, probability distributions, central limit theorem, statistical inference and analysis of variance (ANOVA) will be introduced. We will also draw on our knowledge of probability to understand various measurements related to biology and genetics. The course is not hard but does take a lot of time. You should be working on class assignments and do practices. Your ultimate goal is to understand basic concepts in statistics and apply them to different problems.

LEARNING OBJECTIVES:

At the end of this course the student will be able to:

1. Understand the language of statistics and probability. Describe and analyze an univariate and multivariate data.
2. Use statistical inference to learn from observations and experiments.
3. Learn how deterministic results can be obtained from an infinite number of random data.

4. Understand biology and genetics data and use statistical models to solve other related problems.

iii) Prerequisites:

Knowledge of introductory calculus, linear algebra or equivalent is assumed. Students are also expected to have introductory biology and some knowledge on life sciences.

3. Course information:

During the semester, updated course information can be found at <https://b2lab.wordpress.com/biostatistics/>. Changes will be announced during lectures, please do not miss any class (see below for attendance policy).

Course schedule:

Week	Topics
1	Introduction What is statistics and probability? Frequency distribution, mean, median, standart deviation
2	Data types, structures and relationship Numerical description of data, correlation
3	Introduction to basic probability Events and random variables
4	Probability (2)
5	Probability models Discrete and continous random variables
6	Binomial and poisson distributions
7	Probabability density function Central limit theorem Sampling distriubtions
8	Statistical Inference

Syllabus

	Hypothesis testing Confidence intervals, one sample t-test
9	Two-Sample inference
10	Two-Sample inference (2) Chi-squared test
11	Analysis of variance (ANOVA) Comparing groups of data Introduction to multi-sample problems
12	Linear regression Statistical models
13	Multiple regression
14	Multiple and logistic regression (2)

4. Exam dates and location:

There will be midterm exams and a final exam. Exam dates/location will be determined and announced in class and by the Registrar's Office.

If a student miss online exam because of an unavoidable circumstance and have a legitime excuse, you must return us an official documentation that explains this absence and contact with the course instructor within 3 days after the excuse period is completed to arrange for a make-online exam. No make-up will otherwise be given. If approved, make-online exams will be given at the end of the semester, date will be announced later and will include all topics covered throughout the semester. A hand calculator is necessary for all exams.

5. Important Policies:

- a) **Grading:** The final grade of the student will be calculated according to the following percentages:

Midterm exams:	60 %
Final exam:	40 %

To attend a final exam, average of midterm exams should be higher than 20%. Otherwise no final exam will be given regardless of your homework, first and second midterm exam and you will automatically receive VF grade.

b) **Attendance:** Attendance will be taken through a Google documents. You will also sign the attendance sheet at the end of lecture. It is better not to miss any classes and attend all lectures.

It is your responsibility to find out what was covered in class on days you miss (whether it be class material, notes, an assignments, or a change in the schedule). Class attendance are an important part of the course and they are mandatory. Regular attendance in class, punctuality for lectures and in homework assignments will be taken into positive consideration in determining the final grades of borderline students.

c) **Classroom behavior:** Continued enrollment in this course implies acceptance of the following five agreements:

1. In class, be positive, willing, and prepared.
2. Come to lectures on time.
3. Don't give leaving cues.
4. Be honest, respectful and true.

6. Books and Reading Assignments:

The following books are useful to review key concepts in statistics and probability. You can also find different examples for practice. You can also use other statistics books and check ITU library for reserved books.

Introduction to the practice of statistics (Moore, McCabe, Craig)

Applied statistics and probability for engineers (Montgomery, Runger)

Besides, reading assignments will be given online that include journal papers drawn from literature that are particularly relevant to the lectures.

7. Special Accommodations

If you are in need of some kind of special accommodation (due to a learning or physical disability, special life circumstances, or something else), please let me know as soon as possible by email immediately.

8. Academic Honesty

In case of any form of academic dishonesty, 0 grade will be given for the exam or assignments and ITU Disciplinary Action Committee investigation will be conducted.

9. Collaboration, Plagiarism and Cheating

Collaboration is important for studying and working in your class or research. You will learn how you work with your classmates throughout the semester. We encourage you taking a step to study with other students in class. However, we strongly expect that you must come up with your own solutions. I wrote down below the some of the most frequently asked question and answers about collaboration:

- a) It is not acceptable that you look at your classmate's homework and copy it down. This is called plagiarism, which is prohibited in academics. You are not allowed that you can simply copies the work done by another classmate.
- b) You compare your answers with a classmate, but you should not copy it how the other student solve the problem, write or submit their homework, you should not use other's ideas and code.
- c) Can you get help from your classmate when you have a hard time on class material? Yes you can, but you should make sure that you understand how to solve the problem independently. It is acceptable that someone explains to you how to approach it,
- d) It is not acceptable to use other's homework solutions from Google, Yahoo vs.

Good luck in your class!