

Syllabus,

Introduction to Scientific Computation (BIL-113E)

1. Teaching Staff

Instructor & Teaching Assistants:

Instructor: Assc. Prof. Halil Bayraktar

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Course Website: <https://b2lab.wordpress.com/scientific-computing/>

(14 Lectures)

2. Course Format and Goals.

i) What are the course objectives?

This is an introductory scientific computation course for molecular biology and genetics students. You will understand the use of basic computational methods for solving life science, health and bioengineering problems. Upon successful completion of this course, you will have a sufficient knowledge for coding, algorithm development and data visualization techniques. Besides we hope that you will analyze and apply these methods to solve various biology/genetics problems. We would like to see you using the fundamental principles of computation and coding for quick and effective analysis of your data.

ii) Synopsis

This course introduces fundamental basic concepts in scientific computation. Topics in coding, variables, coding, variables, operators, conditional structures, advance plotting, image analysis will be introduced. We will examine fundamental rules of coding in Matlab. We will also draw on our knowledge of coding and apply it to various measurements related to life science, drug discovery and health. The course is not hard but does take a lot of time. You should always be working problems and do a lot of practices. Your ultimate goal is to understand the coding and how to apply its principles to new problems.

LEARNING OBJECTIVES

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

1. Describe and analyze a variety of data and present them with various plotting techniques including linear plot, polar plot, box plot etc.
2. Acquire basic coding skills for high-throughput data analysis
3. Enhance skills of transition from raw data to presented data.

4. Acquire the language and methods of practical coding.
5. Understand data analysis in biology, genetics, and health.

iii) Prerequisites:

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

3. Course information:

During the semester, updated course information can be found at <https://b2lab.wordpress.com/scientific-computing/>. Changes will be announced during lectures, please do not miss any class (see below for attendance policy). The course schedule and also check the syllabus.

Weekly Topics

- 1 Introduction to Scientific Computing
- 2 MatLab User Interface - Programming Environment
Linear Coding-Variable, Number, Format
- 3 Linear Coding-Variable, Number, Operators, Format (2)
Array of variable, linear plotting, regression
- 4 Advance Plotting
Linear, bar, histogram, polar, rose, 3D plots, surf
- 5 Relational and Logical Operators
- 6 Relational and Logical Operators
- 7 Flow control: Conditional Structures (if, elseif, while), Iteration Structure (for)
- 8 Functions
- 9 Functions (2), linear equations, interpolation, root finding
- 10 Functions and Logic
- 11 Advance Operations - Strings
- 12 Advance Operations - Strings
- 13 Image processing (1)
- 14 Image processing (2)

4. Exam dates:

There will be 2 mid-term exams and a final exam. Exam dates/location will be determined and announced in class and by the Registrar's Office.

Tentative Exam Dates: Midterm exam: to be announced

If a student miss an 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-up exam. No make-up will otherwise be given. If approved, make-up exams will be given at the end of the semester, date will be announced later and will include all topics covered throughout the semester.

5. Important Policies:

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

Midterm exam 1 :	30 %
Midterm exam 2 :	30 %
Final exam:	40 %

To attend a final exam, average of semester activities should be higher than 30 %. Otherwise no final exam will be given regardless of your midterm results and you will automatically receive VF grade.

6. Books and Reading Assignments:

The following resources are useful to review key concepts in using Matlab and scientific computation. You can also find different examples online for practice. You

can also check ITU library for reserved books.

a) Numerical computing with Matlab by Cleve Moler, available for free download at

<http://www.mathworks.com/moler/>.

b) The Matlab demos are available at <https://www.mathworks.com/moler/exm/chapters.html>

7. Important Policies:

a) Attendance:

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 is an important part of the course and they are mandatory. Regular attendance in online lectures, punctuality for lectures will be taken into positive consideration in determining the final grades of borderline students.

b) Classroom Behavior: Follow the list of behavior for continued enrollment in this class that implies the acceptance of the following four agreements:

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

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.

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 science. You will learn more when 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) Is it acceptable that you look at your classmate's homework and copy it down? No.

This is called plagiarism, which is prohibited in academics. It is not allowed that a person simply copies the work done by another classmate.

b) Is it acceptable that you compare your answers with a classmate? Yes you can, but you should not copy it how the other student solve the problem or write a homework, you should always be yourself and 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) Is it acceptable to use other's homework from Google, Yahoo vs.? No.

Good luck in your class