Syllabus

Fall 2025

BIOL 3378 Introduction to Programming for Biologists

TIME: 11am-12:20pm Tue & Thu

LOCATION: BEP 139

INSTRUCTOR:
Dr. Wei-Chin Ho (who@uttyler.edu)
Phone: 903-565-5824
Office hours: 10-noon Mon, 10-11am Tue at HPR 113, or by appointments.

COURSE FORMAT: This course is in a **face-to-face** format. Attendance is expected in this course. Please check Canvas frequently for changes and updates.

COMMUNICATION:
E-mail Policy: When sending an email, please add "**BIOL 3378**" at the beginning of the title and clearly indicate your **name** in the first few sentences of the main text. Please note that the instructor may not be able to respond to emails in two working days.

Canvas Announcements: Announcements are found on Canvas, and depending on your Canvas settings for this class, you will get notified if there is a new one. Please make a point of reading the announcements. This is how I will communicate with the class as a whole when there is important information you need.

COURSE OVERVIEW: This is an introductory course for programming using Python as a focal language. No prior programing experience is required. This course is particularly designed for biology majors or any STEM majors who are interested in biology, as it has an emphasis on how to use programming to solve problems in biology.

LEARNING OUTCOMES:
Upon completion this course, students should be able to:
(1) Explain basic components of programming languages, including variables, data types, operators, and expressions.
(2) Use different control flow structures in their own codes to solve biology questions.
(3) Choose suitable data structures in their own codes for different biological applications.
(4) Use common file formats for molecular sequence data and manipulate them
(5) Write codes to analyze tabular datasets and generate visualizing figures
(6) Perform bioinformatics tasks using relevant libraries
(7) Know general approaches to reduce the time or space complexity of codes

COURSE MATERIALS: All required materials can be found on Canvas and/or will be provided by the instructors. If students are interested with more reading, below are list of books for references:

- Eric Matthes (2023) *Python Crash Course: A Hands-On, Project-Based Introduction to Programming (3e)*, No Starch Press.
- Martin Jones (2013) *Python for Biologists: A complete programming course for beginners,* CreateSpace Independent Publishing Platform.
- Mark Lutz (2013) *Learning Python: Powerful Object-Oriented Programming (5e),* A O'Reilly Media.

GRADING:
The grade for the lecture will be determined by two parts:

1. **Assignments (70%)**: After each lecture, students will practice how to write their codes by finishing the assignments. The general deadline of assignment is at 11am seven days after the lecture. As post-lecture works are open for many days and meant to be finished before the next class, there is generally no make-up after the due time. Please carefully plan your time to finish the works.
2. **Final Exam (30%)**: The course will finish with a final exam covering all the materials. It will be in a take-home and open-book format. However, consulting with living people is PROHIBITED.

Letter grades will be assigned at the end of semester according to the following scale:
A = above 90.00%; B = 80.00-89.99%; C = 70.00-79.99%; D = 60.00-69.99%; F = below 59.99%.

Late Work Policy
No late work is acceptable.

Corrupted File Policy
Any student that turns in a corrupted file will be given 24 hours to turn in a file that can be opened successfully by the instructor. Failure to do so will earn a grade of "0" (Zero) for the paper.

Use of Artificial Intelligence (AI)
UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The

student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course, AI tools are encouraged during the course, and appropriate acknowledgment is expected. You are allowed to use AI tools for assignments and exams as long as a note of acknowledgement to the AI tools is included. Below is an example of note: "ChatGPT and Copilot were used for this assignment."

WHAT IS PLAGIARISM AND HOW CAN IT BE AVOIDED?

Plagiarism may be defined as (1) presenting work, ideas, or phrasing of another, in whole or part, as one's own without giving credit and proper documentation of sources; (2) copying material directly from sources (including electronic media) except when the material is enclosed in quotation marks and the source is clearly identified; (3) paraphrasing too closely to the original, even when the source is identified; and (4) claiming credit for work in any media (electronic, digital, artistic, etc.) where the student is not the original creator of said work. Work that is plagiarized will receive an automatic grade of "F". If you are unsure about this subject, please take the time to talk to your instructor and/or read this:
https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism

SCHEDULE (subject to change*):

#01: Course Introduction: Thinking as a Programmer; Setting Up Programming Environment

#02: Working with Numbers – Variables, Data Types, Basic Operators & Functions

#03: Working with Strings – Variables, Data Types, Basic Operators & Functions

#04: Working with Text Files – Input & Output

#05: Boolean Variables and Operations; Control Flows I: If-Else Statements

#06: Control Flows II: For Loops; Control Flows III: While Loops

#07: Data Structures I: Lists

#08: Data Structures II: Dictionaries

#09: Data Structures III: Numpy Arrays

#10: Data Structures IV: Pandas Data Frames

#11: Data Visualization

#12: Regular Expression

#13: Introduction to Biopython

#14: User-Defined Functions; Introduction to Algorithm Analysis

Take-home Final Exam Due: midnight on Dec 10, Wed

*The program and schedule are subject to change. Please check the announcements at the beginning of the week for any changes.