Fall 2025

BIOL 3378 Introduction to Programming for Biologists
BIOL 3178 Introduction to Programming for Biologists Lab

TIME: Tu Th 11am-12:20pm and Th 2-4:50pm

LOCATION: BEP 139

INSTRUCTOR:
Dr. Wei-Chin Ho (who@uttyler.edu)
Phone: 903-565-5824
Office hours: Tu Th 9:30-11am at HPR 115, or by appoinments

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. The lab is designed for students to use the programming knowledge learned from the course in a research project involving computational 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

Upon completion the lab, students should be able to:

1) Identify research questions in computational biology
2) Planning programming strategy for solving research questions in biology
3) Write codes to manipulate sequence data for biological research
4) Write codes to manipulate tabular datasets for biological research
5) Write codes to generate figures for publication
6) Communicate the research results in computational biology

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 10am 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.

The grade of the lab will be determined by three parts:

1. **Lab Notebooks (50%):** Students will perform programming tasks for each lab and submit the code and the analysis results in the lab notebooks.
2. **Presentation (20%)**: Students will present the results of their research projects in the middle of and at the end of semester.
3. **Final Report (30%)**: Students will finish the lab course with a final written report summarizing all the research work.

Letter grades will be assigned at the end of semester according to the following scale:
A = above 90%; B = 80-89%; C = 70-79%; D = 60-69%; F = below 60%.

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*):

Week 01:

1. Course Introduction
2. Setting Up Programming Environment
3. Working with Numbers - Variables, Data Types, and Basic Operators
4. Working with Numbers - Variables, Data Types, and Basic Operators

Week 02:

1. Working with Strings - Variables, Data Types, and Basic Operators
2. Working with Strings – Funcitons
3. Working with Text Files – Input
4. Working with Text Files – Output

Week 03:

1. Control Flows I: If-Else Statements
2. Control Flows II: While Loops
3. Control Flows III: For Loops
4. Boolean Variables and Operations

Week 04:

1. Data Structures I: Lists
2. Data Structures I: Lists
3. Data Structures II: Dictionaries
4. Data Structures II: Dictionaries

Week 05:

1. Data Structures III: Numpy Arrays
2. Data Structures III: Numpy Arrays
3. Data Structures IV: Pandas Data Frames
4. Data Structures IV: Pandas Data Frames

Week 06:

1. Data Visualization
2. Data Visualization
3. Lab 01: Project Introduction and Search for Literature and Datasets
4. Lab 01: Project Introduction and Search for Literature and Datasets

Week 07:

1. Regular Expression
2. Regular Expression
3. Lab 02: Search for Literature and Datasets (2)
4. Lab 02: Search for Literature and Datasets (2)

Week 08:

1. Introduction to Biopython
2. Introduction to Biopython
3. Lab 03: Search for Literature and Datasets (3)
4. Lab 03: Search for Literature and Datasets (3)

Week 09:

1. User-Defined Functions
2. Introduction to Algorithm Analysis
3. Lab 04: Presentation #1
4. Lab 04: Presentation #1

Week 10:

1. Lab 05: Analyzing Genome-Wide Resequencing Data
2. Lab 05: Analyzing Genome-Wide Resequencing Data
3. Lab 06: Analyzing Genome-Wide Resequencing Data (2)
4. Lab 06: Analyzing Genome-Wide Resequencing Data (2)

Week 11:

1. Lab 07: Analyzing Transcriptomic Data
2. Lab 07: Analyzing Transcriptomic Data
3. Lab 08: Analyzing Transcriptomic Data (2)
4. Lab 08: Analyzing Transcriptomic Data (2)

Week 12:

1. Lab 09: Analyzing Tabular Data
2. Lab 09: Analyzing Tabular Data
3. Lab 10: Presentation #2
4. Lab 10: Presentation #2

Week 13/Week14:

1. Lab 11: Analyzing Tabular Data (2)
2. Lab 11: Analyzing Tabular Data (2)
3. Lab 12: Statistical Analysis & Data Visulization
4. Lab 12: Statistical Analysis & Data Visulization

Week 15:

1. Lab 13: Statistical Analysis & Data Visulization (2)
2. Lab 13: Statistical Analysis & Data Visulization (2)
3. Lab 14: Final Presentation
4. Lab 14: Final Presentation

Final Week:
Take-home Final Exam;
Lab Final Report Due

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

Resources to assist you in this course:

- UT Tyler Student Accessibility and Resource (SAR) Office. (provides needed accommodations to students with document needs related to access and learning)
- UT Tyler Writing Center.
- The Mathematics Learning Center.
- UT Tyler PASS Tutoring Center.
- UT Tyler Supplemental Instruction.
- Upswing (24/7 online tutoring)
- Robert Muntz Library and Library Liaison.
- Canvas 101 (learn to use Canvas, proctoring, Unicheck, and other software)
- LIB 422 -- Computer Lab where students can take a proctored exam
- The Career Success Center.
- UT Tyler Testing Center.
- Office of Research & Scholarship Design and Data Analysis Lab.

Resources available to UT Tyler Students:

- UT Tyler Counseling Center.(available to all students)
- My SSP App. (24/7 access to Student Support Program counseling through phone or chat and online wellness resources available in a variety of languages)
- Student Assistance and Advocacy Center.
- Military and Veterans Success Center.(supports for all of our military-affiliated students)
- UT Tyler Patriot Food Pantry.
- UT Tyler Financial Aid and Scholarships.
- UT Tyler Registrar's Office.
- Office of International Programs.
- Title IX Reporting.
- Patriots Engage. (available to all students. Get engaged at UT Tyler.)

University Policies and Information

Withdrawing from Class - Students, you are allowed to withdraw (drop) from this course through the Withdrawal Portal. Withdrawing from classes can impact Financial Aid, Scholarships, Veteran Benefits, Exemptions, Waivers, International Student Status, housing, and degree progress. Please read this page, speak with your instructors, consider your options, and speak with your instructor. UT Tyler faculty and staff are here for our students and often can provide additional support options or student assistance**.** Please read the implications for withdrawing from a course and the instructions on using the Withdrawal portal on the Registrar's Withdrawal page.
Texas law prohibits students who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at other 2-year or 4-year Texas public colleges and universities. Consider the impact withdrawing from this class has on your academic progress and other areas, such as financial implications. We encourage you to consult your advisor(s) and financial aid for additional guidance. CAUTION #1: Withdrawing before census day does not mean you get a full refund. Please see the Tuition and Fee Refund Schedule. CAUTION #2: All international students must check with the Office of International Programs before withdrawing. All international students are required to enroll full-time for fall and spring terms. CAUTION #3: All UT Tyler Athletes must check with the Athletic Academic Coordinator before withdrawing from a course. CAUTION #4: All veterans or military-affiliated students should consult with the Military and Veterans Success Center.

Final Exam Policy: Final examinations are administered as scheduled. If unusual circumstances require that special arrangements be made for an individual student or class, the Dean of the appropriate college, after consultation with the faculty member involved, may authorize an exception to the schedule. Faculty members must maintain student final examination papers for a minimum of three months following the examination date.

Incomplete Grade Policy: If a student, because of extenuating circumstances, is unable to complete all of the requirements for a course by the end of the semester, then the instructor may recommend an Incomplete (I) for the course. The "I" may be assigned in place of a grade only when all of the following conditions are met: (a) the student has been making satisfactory progress in the course; (b) the student is unable to complete all coursework or final exam due to unusual circumstances that are beyond personal control and are acceptable to the instructor, and (c) the student presents these reasons before the time that the final grade roster is due. The semester credit hours for an Incomplete will not be used to calculate the grade point average.
The student and the instructor must submit an Incomplete Form detailing the work required and the time by which the work must be completed to their respective department chair or college dean for approval. The time limit established must not exceed one year. Should the student fail to meet all of the work for the course within the time limit, then the instructor may assign zeros to the unfinished work, compute the course average for the student, and assign the appropriate grade. If a grade has yet to be assigned within one year, then the Incomplete

will be changed to an F, or NC. If the course was initially taken under the CR/NC grading basis, this may adversely affect the student's academic standing.

Grade Appeal Policy: Disputes regarding grades must be initiated within sixty (60) days from the date of receiving the final course grade by filing a Grade Appeal Form with the instructor who assigned the grade; this is separate from the Application for Appeal form submitted to the Student Appeals Committee, which does not rule on grade disputes as described in this policy. If the student is not satisfied with the decision, the student may appeal in writing to the Chairperson of the department from which the grade was issued. In situations where there is an allegation of capricious grading, discrimination, or unlawful actions, appeals may go beyond the Chairperson to the Dean of the college from which the grade was issued, with that decision being final. The Grade Appeal form is found in the Registrar's Form Library.

Disability/Accessibility Services: In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA), the University of Texas at Tyler offers accommodations to students with learning, physical, and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with the Assistant Director Student Accessibility and Resources/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at https://www.uttyler.edu/disability-services, the SAR office located in the University Center, # 3150, or call 903.566.7079."

Military Affiliated Students: UT Tyler honors the service and sacrifices of our military-affiliated students. If you are a student who is a veteran, on active duty, in the reserves or National Guard, or a military spouse or dependent, please stay in contact with your faculty member if any aspect of your present or prior service or family situation makes it difficult for you to fulfill the requirements of a course or creates disruption in your academic progress. It is important to make your faculty members aware of any complications as far in advance as possible. Your faculty member is willing to work with you and, if needed, put you in contact with university staff who are trained to assist you. The Military and Veterans Success Center (MVSC)has campus resources for military-affiliated students. The MVSC can be reached at MVSC@uttyler.edu or via phone at 903.565.5972.

Academic Honesty and Academic Misconduct: The UT Tyler community comes together to pledge that "Honor and integrity will not allow me to lie, cheat, or steal, nor to accept the actions of those who do." Therefore, we enforce the Student Conduct and Discipline policy in the Student Manual Of Operating Procedures (Section 8).

Family Educational Rights and Privacy Act (FERPA): UT Tyler follows the Family Educational Rights and Privacy Act (FERPA) as noted in University Policy 5.2.3. The course instructor will follow all requirements to protect your confidential information.

Absence for Official University Events or Activities: This course follows the practices related to approved absences as noted by the Student Manual of Operating Procedures (Sec. 1 -501).

Absence for Religious Holidays: This course follows the practices related to Excused Absences for Religious Holy Days as noted in the Catalog.

Campus Carry: We respect the right and privacy of students who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php .