BIOL 4306-001 Bioinformatics Lecture
Fall 2024

Meeting time: MWF 8:00 AM – 8:55 AM
Meeting classroom: BEP 139/140

Instructor: Matthew Greenwold, Ph.D., Assistant Professor of Biology
Office: HPR 117
Office Hours: MWF 9:30 AM – 10:30 AM or by appointment.
Email: mgreenwold@uttyler.edu
Phone: 903.566.6303

Course Description: Covers principles and methods of analyzing large biological datasets with emphasis on genomes, including use of a computer to answer questions in biology.

Prerequisite: BIOL 1306/1106 and BIOL 1307/1107. Corequisite: BIOL 4106

Course Learning Objectives: By the end of the course, students should be able to:

- Navigate and find molecular data on public depositories
- Differentiate the main theories of molecular evolution
- Differentiate and execute global and local alignments of molecular data
- Select the best fitting substitution model
- Differentiate the major phylogenetic methods
- Understand the steps for analyzing next-generation sequencing data for metabarcoding, genomics, phylogenomics, and transcriptomics.

Required Course Materials: **No required textbook**. An USB flash drive ($\geq$ 1.0 GB) is strongly recommended for backing up your data for lab.

Grading: Your grade will be based on four semester exams, a final exam, class discussions, and attendance.

Exam 1 =	15%
Exam 2 =	15%
Exam 3 =	15%
Exam 4 =	15%
Discussions (3) =	15%
Final Exam =	15%
Attendance =	10%
Total	100%

Grading	
Percentage	**Grade**
90-100%	A
80-89%	B
70-79%	C
60-69%	D
< 60%	F

Exams: There will be four semester exams. Please see schedule below for exam dates. You will have the entire class period to finish the exam. They will consist mostly of short answer/essay but may also include true/false and multiple-choice questions.

Final Exam: The final exam will be 50% new material and 50% old material and consist of essay/short answer, True/False, and multiple-choice questions. The final exam will take place at the date and time specified by the University for this course.

Discussions: The discussions will consist of an in class reading assignment followed by group discussion guided by instructor provided questions.

Attendance: Attendance is mandatory. I am required to provide attendance data for Financial Aid, midterm, and final grades submissions; therefore, it is critical that you attend our class meetings. If you cannot attend for reasons of Illness or other acceptable situations, please contact me to determine the best course of action. You are allowed to miss three meetings without receiving a reduction in points.

Course Schedule	
Week of	**Topic**
Aug. 26th	Introduction to course
Sept. 2nd	Molecular biology (**Discussion 1 – Wednesday**)
Sept. 9th	Next generation sequencing (**Exam 1 – Monday**)
Sept. 16th	Public databases
Sept. 23rd	Molecular sequence alignments
Sept. 30th	BLAST / Substitution models (**Exam 2 – Monday**)
Oct. 7th	Phylogenetics (**Discussion 2 – Monday**)
Oct. 14th	Phylogenomics
Oct. 21st	Theories of molecular evolution (**Exam 3 – Monday**)
Oct. 28th	Phylogenetic comparative methods
Nov. 4th	Metabarcoding (**Discussion 3 – Monday**)
Nov. 11th	Metabarcoding (**Exam 4 – Monday**)
Nov. 18th	Genomics
Nov. 25th	*No Classes* – Thanksgiving Break
Dec. 2nd	Transcriptomics
Dec. 9-13th	Final Exams

*September 9th – Census date

Late Work: No late work will be accepted! Part of learning to be a scientist is learning time management. When you are in a job or working on grants - deadlines are final! If you miss the deadline, you cannot submit; therefore, this will be good practice for your future career. If for some reason you cannot attend class or turn in an assignment, please reach out to Dr. Greenwold to determine if a deadline extension can be granted.

Make-Up Exams: You must take the exams on the scheduled dates. Please mark your calendars now, so that you do not have conflicts. If an absence cannot be avoided, the professor must be notified in advance. If a student is unable to take an exam when scheduled, following appropriate documentation of the absence, the professor will arrange a make-up exam or provide an oral version depending on the nature of the absence. The make-up exam will NOT be the same format or questions as the original exam.

Use of Artificial Intelligence in this course: During some class assignments, we may leverage AI tools to support your learning, allow you to explore how AI tools can be used, and/or better understand their benefits and limitations. Learning how to use AI is an emerging skill, and we will work through the limitations of these evolving systems together. However, AI will be limited to assignments where AI is a critical component of the learning activity. I will always indicate when and where the use of AI tools for this course is appropriate.