

**BIOL 4106-001 Bioinformatics Lab**  
**Fall 2024**

**Meeting time:** Monday 2:00 PM – 4:50 PM

**Meeting classroom:** BEP 00139

**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 4306

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

- Understand and utilize standard Unix commands.
- Navigate and find molecular data on public depositories.
- Differentiate and execute global and local alignments of molecular data.
- Select the best fitting substitution model for molecular data.
- Perform phylogenetic analyses.
- Perform metabarcoding analyses using Qiime2.
- Perform basic statistics with R programming language.

**Required Course Materials:** No required textbook.

**Grading:** Your grade will be based on class participation and three lab practicals. Class participation and each lab practical will be worth 25% of your grade.

<b>Grading</b>	
<b>Percentage</b>	<b>Grade</b>
90-100%	A
80-90%	B
70-79%	C
60-69%	D
< 59%	F

**Class participation:** This will be based on attendance, your engagement during class, and in-class questions related to in-class assignments. You will receive a participation grade for each lab. Participation will be worth 25% of your grade. You are allowed to miss ONE lab meeting without receiving a reduction in points.

**Practicals:** There will be three lab practicals. Please see below schedule for dates. Each lab practical will be worth 25% of your grade. You will have the entire class period to complete the practical. They will consist of short exercises to test your knowledge and ability. You will be allowed to use any resource (notes, internet, google), but you must complete it in the allotted time.

Course Schedule	
Day	Topic
Aug. 26 <sup>th</sup>	Introduction to Linux - Ubuntu
Sept. 2 <sup>nd</sup>	<i>No Classes</i> – Labor Day
Sept. 9 <sup>th</sup>	Molecular data files and processing
Sept. 16 <sup>th</sup>	Public databases
Sept. 23 <sup>rd</sup>	<b>Lab practical 1</b>
Sept. 30 <sup>th</sup>	BLAST
Oct. 7 <sup>th</sup>	Sequence alignments
Oct. 14 <sup>th</sup>	Substitution models
Oct. 21 <sup>st</sup>	Phylogenetics
Oct. 28 <sup>th</sup>	<b>Spring break – No classes</b>
Nov. 4 <sup>th</sup>	<b>Lab practical 2</b>
Nov. 11 <sup>th</sup>	Metabarcoding
Nov. 18 <sup>th</sup>	Metabarcoding
Nov. 25 <sup>th</sup>	R programming language
Dec. 2 <sup>nd</sup>	<b>Lab practical 3</b>

\*September 9<sup>th</sup> – 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 lab practicals 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 a lab practical when scheduled, following appropriate documentation of the absence, the professor will arrange a make-up lab practical or provide an alternative version depending on the nature of the absence. The make-up lab practical will NOT be the same format or questions as the original lab practical.

**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.