

BIOL 5342 BIOINFORMATICS FOR RESEARCH

Spring 2024

Meeting time: Monday 9:00 AM – 11:45 PM

Meeting classroom: BEP 139

Instructor: Matthew Greenwold, Ph.D.

Office: HPR 117

Office Hours: Wednesday 9:00 AM – 12:00 PM or by appointment

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Phone: 903.566.6303

Course Description: Focus on essential computational skills for research in contemporary biology, with an emphasis on large scale data and reproducibility.

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

- Describe the various next generation sequencing technologies and understand the steps for analyzing next-generation sequencing data for metabarcoding, genomics, and phylogenomics.
- Use R to perform statistical analyses and analyze metabarcoding datasets.
- Navigate the Linux environment and use UNIX shell.
- Perform UNIX command line programming and be able to install and use open-source bioinformatics software.
- Reconstruct the evolutionary history of genes/species/strains using phylogenetics.
- Differentiate the main theories of molecular evolution.

Required Course Materials: No textbook required.

Grading: Your grade will be based on class participation, two exams (midterm and final) and an individual project. The final exam will be cumulative. Your class participation will be based on the completion of in class assignments. I will describe the individual project requirements in detail during our first class meeting.

In class assignments: 25%

Exams: 2 X 25% = 50%

Individual Project: 25%

Grade Distribution	
Percentage	Grade
90-100%	A
80-89%	B
70-79%	C
60-69%	D

< 59%	F
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Attendance: Attendance is mandatory and part of your class participation grade. You will be allowed to make up ONE in class assignment. You will receive a zero for additional missed in class assignments.

Course Schedule	
Date	Topic
Jan. 22 nd	Introduction to course / Introduction to R programming language
Jan. 29 th	Molecular Biology / Statistics in R
Feb. 5 th	Next generation sequencing / Introduction to UNIX
Feb. 12 th	Public databases
Feb. 19 th	Molecular sequence alignments
Feb. 26 th	Midterm Exam
Mar. 4 th	BLAST / Substitution models
Mar. 11 th	<i>Spring Break – No classes</i>
Mar. 18 th	Phylogenetics
Mar. 25 th	Molecular evolution theory
Apr. 1 st	Metabarcoding
Apr. 8 th	Metabarcoding
Apr. 15 th	Metabarcoding
Apr. 22 nd	Final Exam

Census day is Jan. 29th.

Student Resources

Resources to assist you in this course

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

Resources available to UT Tyler Students

- [UT Tyler Counseling Center](#) (available to all students). Links to an external site.
- [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). Links to an external site.
- [Student Assistance and Advocacy Center](#). Links to an external site.
- [Military and Veterans Success Center](#) (supports for all of our military-affiliated students). Links to an external site.
- [UT Tyler Patriot Food Pantry](#). Links to an external site.
- [UT Tyler Financial Aid and Scholarships](#). Links to an external site.
- [UT Tyler Registrar's Office](#). Links to an external site.
- [Office of International Programs](#). Links to an external site.
- [Title IX Reporting](#). Links to an external site.
- [Patriots Engage](#). Links to an external site. (available to all students. Get engaged at UT Tyler.)

University Policies and Information

Withdrawing from Class - Students, you are allowed to [withdraw](#). Links to an external site. (drop) from this course through the [Withdrawal Portal](#). Links to an external site. 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](#). Links to an external site. 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](#). Links to an external site. CAUTION #2: All international students must check with the [Office of International Programs](#). Links to an external site. 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](#). Links to an external site.

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](#). Links to an external site.

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>. Links to an external site. 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>. Links to an external site., 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 member 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 \(MVSC\)](#). Links to an external site. 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](#). Links to an external site. in the Student Manual Of Operating Procedures (Section 8).

FERPA - UT Tyler follows the Family Educational Rights and Privacy Act (FERPA) as noted in [University Policy 5.2.3 Links to an external site.](#). 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](#) Links to an external site.).

Absence for Religious Holidays: This course follows the practices related to [Excused Absences for Religious Holy Days as noted in the Catalog](#). Links to an external site.

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>.