Genomes and Genome Evolution (BIOL 6301) - Fall 2019

Learning Objectives	After completing this course, students will be able to: - Describe the methods and principle of modern genome analysis - Work through real genome assembly and analysis pipelines using available data - Describe the components and structure of viral, prokaryotic and eukaryotic genomes - Explain the basic techniques of genome sequencing and analysis - Describe the way genomes change over time - Apply principles of genomics to modern biological questions - Explain the objectives and outcomes of a variety of genome projects
Lectures	MWF 10:00-10:50. Biology 106. You are expected to attend all lectures. Failure to attend will be detrimental to your grade.
Professor	Dr. David Ray, ESB 206, 806-834-1677, david.a.ray@ttu.edu Office Hrs: TTh (9:00-10:00)
Textbook and Lecture Notes	Class lectures and supplementary information in the form of animations, FAQs, and extra reading will be available on the class website (http://www.davidraylab.com). There is no official textbook for the class. However, I used two books as guides for designing my lectures: Introduction to Genomics 2nd Edition by Arthur M. Lesk and The Origins of Genome Architecture by Michael Lynch. Feel free to purchase them or not.
Grading	Final averages will be calculated as a percentage of the available points (Only a single letter grade will be issued). Letter grades will be determined as: **Graduate Students: A** (93-100%), **B** (83-92%), **C** (73-82%), **D** (65-72%), **F** (≤65%) **Points available: Graduate students**: 3 x 100 pts (exams) + 50 pts (in-class discussion of genomics paper) + 50 pts (current events) + 50 pts (genomics presentations) = 450 pts
Topics	Unit 1. Introduction & Biological Concepts Unit 2. Genomes as the Hub of Biology Unit 3. Maps, Sequencing, Assembly, etc. Unit 4. Practical Application – Assembly pipelines and variant calling Unit 5. Transcriptomics and Gene Annotation Unit 6. Transposable Elements Unit 7. Genomic Medicine Unit 8. Organismal Genomes Topics are issued for general information, and deviations from the schedule will likely occur. The Instructor reserves the right to make corrections and/or changes, and you will, of course, be informed about these.
Important Dates	August 26 – Classes begin September 2 – Labor Day holiday September 25 – Exam 1 October 30 – Exam 2 November 27 – December 1 – Thanksgiving holiday December 10 @ 7:30 am (or as arranged by the class) – Exam 3 The third exam will be partially cumulative. In other words, it will consist of about 2/3 new material (presented after the second exam). The remaining third will be older material.
Honor Statement	Dishonesty on tests, quizzes, written work, or connected with your attendance in lab or lecture will have serious consequences. Students are expected to be aware of, and abide by, the University's Honor code. Plagiarism on written lab reports or essays (copying/paraphrasing from other students or from other sources without giving due credit) will result in the loss of all points for that exercise, at the very least.

Exams and Other Assignments	EXAMS: Three exams (variable formats) worth 100 points each (see schedule) including partially or wholly take-home and will be writing-intensive. Exam 3 will be partially cumulative. Graduate student exams will be more intensive than for undergraduates consisting of additional application-based questions. Make-up exams will **ONLY** be given to those who present documentation explaining their absence immediately upon their return to class. Please inform me of absences in advance so that arrangements for a make-up exam can be made. Make-up exams will be of a different format and have different questions from the regularly scheduled exam. Students who miss an exam without a valid excuse will receive a **ZERO** for that exam. CURRENT EVENTS: Genomics is becoming a topic of discussion in everyday life. As the semester proceeds, each student is required to bring to class at least four examples of news items or examples from popular culture that are related to Genomics. Items could be news articles or reports, references in popular television shows, personal experiences, etc. Students will present two of these to the class in the form of short (~5 monutes) guided discussions. To avoid all the current events piling up at the end of the semester, a limit of no more than two in-class presentations are allowed per class. These will be scheduled first come, first served. If you make it to the last few days of class and others submit their CEs before you, you may not be able to present and will not get full credit.Each current event must be approved by the instructor by e-mail. For approval, the student should forward a link or other summary information. Further, for each item, the student must provide a short write-up. That write-up will consist of three sections of a few sentences each. The three sections are: 1) Relevance to the class, 2) Interest to the student, and 3) a summary of the item. GENOMICS PRESENTATION: Graduate students are required to present one lecture on a topic related to Genomics and agreed to by the instructor. This should be a teaching lecture geared at undergraduates and must include information that can be used for the final examination in the course. IN CLASS DISCUSSION: Each week, two graduate students will be required to present a critical analyses of two recently published genome manuscript. All students should be prepared for exam questions that may be derived from the papers. The manuscripts will be assigned to the class in advance and each graduate student in the class should be prepared to give a brief (15-20 minutes) presentation to the class on that day. Like the genomics presentations, the information presented here is fair game for the exams. Information that should be included in that presentation should include the following: 1. The goal of the project, including enough background for us to understand the rationale. 2. The phylogenetic context of the species 3. The methods used and the rationale behind them. 4. The sequencing technology used. 5. Basic assembly statistics (genome size, N50 of the resulting assembly, etc.), if relevant. 6. Major results of the effort (What was discovered? What questions were answered? Etc.) 7. Remaining questions you have about the genome/effort? 8. Weaknesses observed in the methods, analyses, and interpretations. 9. Extensions you see to your own work. 10. Two questions for the class to discuss about the paper
Religious Holidays	Students who intend to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent for the observance of a religious holy day shall be allowed to take an exam or complete an assignment scheduled for that day within a reasonable time after the absence.
Evacuation Plan	In the event of an emergency, leave the classroom in an orderly manner. Leave the building through the nearest outside door and quickly move as far away as possible. Do not gather near building or parking lots.