<table>
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<th><strong>Recommended Co-requisite</strong></th>
<th>Co-registration in Biological Informatics BIOL 4301/6301</th>
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| **Learning Objectives**     | - After completing this course, students will be able to:  
- Describe the methods and principle of modern genome analysis  
- 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 outcomes of a variety of genome projects |
| **Lectures**                | MWF 10:00-10:50. You are expected to attend all lectures. Failure to attend will be detrimental to your grade. |
| **Professor**              | Dr. David Ray, ESB 206, 806-742-3722 ext. 253, david.a.ray@ttu.edu  
Office Hrs: MTW (3:00-4:00) |
| **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.myweb.ttu.edu/daray).  
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. |
| **Exams**                  | Three exams (variable formats) worth 100 points each (see schedule). Exam 3 will be partially cumulative. |
| **Graduate Students**       | Graduate students will be required to participate in a separate weekly discussion group in which we will discuss current publications on selected topics. During this weekly discussion students will give class presentations on a topic (approved by Dr. Ray) relating to recent research in genomics and genome evolution. |
| **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:  
**Undergraduates**: A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (≤59%)  
**Graduate students**: A (93-100%), B (83-92%), C (73-82%), D (65-72%), F (≤65%)  
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.  
**Point scale**: Undergraduates: 3 x 100 pts (exams) = 30 pts  
Graduate students: 3 x 100 pts (exams) + 100 pts (presentation) + 50 pts (discussion participation) = 450 pts |
| **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. |
| **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. |
TOPICS
Unit 1. Introduction & Biological Concepts
Unit 2. Genomes as the Hub of Biology
Unit 3. Maps, Sequencing, Assembly, etc.
Unit 4. Transposable Elements
Unit 5. Genomic Medicine
Unit 6. Organismal Genomes
Unit 7. Selected Genome Projects
1) *Methanococcus jannaschii* (Science 273:1058-1073)
2) *Saccharomyces cerevisiae* (Science 274:563-567)
3) *Arabidopsis thaliana* (Nature 408:796-815)
4) *Ciona intestinalis* (Science 298:2157-2167)
5) *Fugu rubripes* (Science 297:1301-1310)
6) *Canis familiaris* (Nature 438:803-819)
7) Picea abies (Nature 497:579-584)
9) Three crocodilians (Science 346:125449)
10) Echolocation (Nature 502:228-231)
11) Avian comparative genomics (Science 346:1311-1320)
Unit 7. Transcriptomics and Gene Annotation

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.

EXAM SCHEDULE
Exam 1 – February 20
Exam 2 – March 28
Exam 3 – May 9 @ 10:30 am (or as arranged by the class)
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.

As upper level students, you should understand that none of the information presented in this class exists on its own. Each bit of knowledge to be communicated has a historical context grounded in rigorous experimentation and hard work. “How do you know that to be true?” is one of the most important questions in the scientist’s toolbox and you should feel free to ask at any time. That doesn’t mean I’ll always know the answer, just that it’s ok to ask. After the question is asked, we will work together to determine the answer.