

## Transposable Elements (BIOL 6301) - Fall 2018

<b>Synopsis</b>	Although most genetics textbooks and courses focus on <i>static</i> DNA (inherited generation to generation within a lineage), a great deal of DNA is <i>mobile</i> and can replicate independent of cell division and/or move within and between lineages. While the term is not inclusive of all mobile DNAs, the most common type of DNA within this category is referred to as transposable elements (TEs). Indeed, TEs often account for more than half of any given genome. Unconstrained by the confines of a particular genome or cell, TEs are the focus of a dynamic and growing body of research. The aim of this course is to learn more about this special, but not small, category of DNA.
<b>Meeting times and place</b>	MWF 10:00 am - 10:50 in room 106 (or as arranged by the class). You are expected to attend all class meetings. Failure to attend will be detrimental to your grade.
<b>Professor</b>	Dr. David A Ray, ESB 206, 806-834-1677 ext. 253, david.a.ray@ttu.edu Office hours: M/T/W (3:00-4:00)
<b>Website</b>	<a href="http://www.davidraylab.com">http://www.davidraylab.com</a>
<b>Reading materials</b>	No current and comprehensive text on transposable element biology exists. We will rely in recent, up-to-date manuscripts including review papers and research as well as some tutorials on how to do basic TE analysis using a Unix operating system.
<b>Course format</b>	<p>During our first session, everyone will choose one or several type(s) of transposable elements or TE-related topics to become an expert on. The number of topics for which you are responsible will depend on class enrollment. For everyone's benefit, each person will make a 'cheat sheet' on their topic(s), so everyone will end up with a compendium of cheat sheets as a reference for their reading during the rest of the course.</p> <p><b>There will be two focus areas for the course. The first focus area will be on the methods and software associated with basic TE analyses.</b> These topics will include de novo TE discovery, genome annotation, and TE dynamics. Students will be responsible for choosing a set of relatively closely related organisms with genome drafts available and they will analyze those genomes throughout the semester to investigate the TE dynamics of those organisms. Basic instruction will be in class with additional work performed on your own.</p> <p><b>The second area of focus will be on current literature in the field of TE research. For most weeks, we will read, discuss and analyze papers: one review paper (RP) and two papers from the primary literature (PLPs).</b> For RP class sessions, one person will be responsible for presenting a 30-40 minute lecture detailing the paper and any necessary background information for the class. Concluding the lecture should be a list of discussion topics that will be the focus of the rest of the class period. The discussion will be led by the student presenter. For PLP class sessions, we will discuss a research manuscript from the primary literature of a PLP (related to the topic of the RP from the <i>previous</i> session). One student will be responsible for presenting that paper, in a 15-20 minute presentation. RPs and PLPs will be generally chosen by Dr. Ray but there is some flexibility. If you know of a paper that is relevant and would like to switch, it can be considered. Presenters <b>must</b> plan ahead. Everyone must read all manuscripts before coming to class each week.</p> <p>Each person will be expected to present at several RPs and PLPs during the semester. Students in the class will evaluate their fellow students' presentations as part of the course and those evaluations will influence final grades.</p>
<b>Manuscript discussion and analysis</b>	Each person (individually) must write a <b>short PLP summary</b> on any PLP they present in class ( $\leq 200$ words). It should NOT simply be a copy of the abstract but should instead be a summary of the manuscript in your own words detailing the main hypotheses, methods, and implications of the work. An example is available on the course website. Student <b>PowerPoint presentations</b> on the papers they present must be provided to the instructor at least one hour before class.

<b>Basic TE Analysis</b>	Each student will <b>present their TE annotation project</b> at the end of the semester in written and oral form. The presentation should detail, the background rationale for the project, the major results, and the conclusions. It would be great if this could be turned into a publishable unit.
<b>Topics</b>	<p>Transposable Element Basics</p> <p>Genome annotation with RepeatMasker</p> <p>De novo TE annotation using CARP</p> <p>TEs and genome size and composition</p> <p>TE impacts on human biology</p> <p>TEs and evolutionary change</p> <p>TEs in population genetics and ecology</p> <p>Horizontal transfer</p> <p>TE identification</p> <p>TE control</p> <p>Retrotransposition mechanisms</p>
<b>Grading</b>	<p>My goal for this course is to have you guide your learning and contribute to your development as graduate students. Two important skills for any graduate student to develop are the abilities to analyze scientific writings and to communicate concepts effectively to an audience. As such, your grade in this course will be a reflection of your ability to perform these two tasks. 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:</p> <p><b>A (93-100%), B (83-92%), C (73-82%), D (65-72%), F (<math>\leq</math>65%)</b></p> <p>There are no exams. Grade will be calculated based on the following weighting scheme:</p> <p>RP presentations – 20%</p> <p>PLP presentations – 20%</p> <p>PLP summaries – 10%</p> <p>Student evaluations of presentations – 10%</p> <p>TE annotation project – 40% (20% presentation, 20% written report)</p>
<b>Evacuation plan</b>	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.
<b>Honor Statement</b>	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.
<b>ADA Statement</b>	Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as possible to make necessary arrangements. Students must present appropriate verification from Student Disability Services during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services office in 335 West Hall or call 806-742-2405.
<b>Religious Holidays</b>	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.

<b>Title IX</b>	<p>Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the <i>Office for Student Rights &amp; Resolution</i>, (806)-742-SAFE (7233) or file a report online <a href="http://attitleix.ttu.edu/students">attitleix.ttu.edu/students</a>. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: <b>TTU Student Counseling Center</b>, 806-742-3674, <a href="https://www.depts.ttu.edu/scc/">https://www.depts.ttu.edu/scc/</a> (<i>Provides confidential support on campus.</i>) <b>TTU Student Counseling Center 24-hour Helpline</b>, 806-742-5555, (<i>Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.</i>) <b>Voice of Hope Lubbock Rape Crisis Center</b>, 806-763-7273, <a href="http://voiceofhopelubbock.org">voiceofhopelubbock.org</a> (<i>24-hour hotline that provides support for survivors of sexual violence.</i>) <b>The Risk, Intervention, Safety and Education (RISE) Office</b>, 806-742-2110, <a href="http://rise.ttu.edu">rise.ttu.edu</a> (<i>Provides a range of resources and support options focused on prevention education and student wellness.</i>) <b>Texas Tech Police Department</b>, 806-742-3931, <a href="http://www.depts.ttu.edu/ttpd/">http://www.depts.ttu.edu/ttpd/</a> (<i>To report criminal activity that occurs on or near Texas Tech campus.</i>)</p>
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