Biol 5308 – Genome Structure and Dynamics  
Spring 2014

Professors: Dr. Matthew K. Fujita & Dr. Todd A. Castoe

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Office Hours:  
Dr. Fujita – By appointment  
Dr. Castoe – Tues, Thurs, 2-3 pm

Class time and place: Tuesday 5:30-8:30 am, Fine Arts 411

Course description: This course will provide students with hands-on experience in genome analysis and how results of these analyses should be used to construct scientific literature. Topics covered include population genomics, phylogenomics, genome assembly, and the analysis of repetitive elements and genome structure. Students will learn the computational tools to analyze genomes, including Unix/Linux, some light Perl programming, and database management.

Student outcomes: This course will prepare students to analyze genomic data and to write a manuscript for a genomics scientific journal. Students will strengthen their computational skills and obtain a foundation on the theory and practice of genome analysis tools.

Prerequisite: Graduate student status (or consent of instructor).

Course Format: The class will primarily consist of lectures and in class demonstrations.

Textbook: There is no required textbook. Some recommended books include:  
• Felsenstein, J. 2005. Theoretical Evolutionary Genetics (free ebook)  
**Course Website**: Blackboard (https://elearn.uta.edu)

**Description of major assignments and examinations**: This course will consist of weekly assignments and a final project. The assignments will require access to the Internet and will involve the exploration and analysis of genomic data. The homework may also require critical interpretation of assigned literature related to course topics; these readings will be specified during lecture. The final project will require (a) a written proposal, (b) a presentation of the final project in class, and (c) submission of a final paper written in scientific format.

**Evaluation**:  
Your grade will be based on weekly homework assignments (60%), and individual final projects, (written proposal = 10%, presentation = 15%, and paper = 25%). Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

\[
\begin{align*}
\text{>=90\%} &= \text{A} \\
89-80\% &= \text{B} \\
79-70\% &= \text{C} \\
69-60\% &= \text{D} \\
<60\% &= \text{F}
\end{align*}
\]

**Exam, homework, and credit policy**: The final project components (proposal, presentation, and final paper) are due by the specified date on the schedule. Late proposals and papers will be penalized 10% each late day, including weekends. If you turn in your homework late, you will lose 10% of your score for each late day (including weekends). The lowest-scoring homework will be dropped when calculating your homework grade.

**Project Proposal**: The project proposal will be due on the second class meeting and will have to closely follow the supplied template. This proposal will guide your final project, which needs to be an original analysis of your data or published data. In addition, we will consider the quality of your prose into your grade so you must pay very careful attention to your writing. *We are happy to help with writing the proposal.*

**Project Presentation**: At the completion of your project, you will be required to provide a 15-minute presentation to showcase your results. We anticipate presentations on par to those given at international scientific meetings and/or invited seminars.

**Final Project Paper**: The final project will be in the form of a manuscript to the journal *Genome Biology and Evolution*. It should have Again, we will closely monitor the quality of your writing. You must also strictly adhere to the guidelines of the journals.
Attendance: Attendance will not be taken, but students remain responsible for turning in weekly homework assignments even if they missed the class.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week (3 hours per unit) of their own time in course-related activities, including reading and homework. Reading will involve literature available on the Internet.

Tentative Course Schedule: this tentative schedule of topics might be altered as need be by the instructors.

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Person</th>
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<tbody>
<tr>
<td>15-Jan-14</td>
<td>Unix, compiling, etc</td>
<td>Castoe</td>
</tr>
<tr>
<td>22-Jan-14</td>
<td>Large scale alignment</td>
<td>Castoe</td>
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<tr>
<td>29-Jan-14</td>
<td>MCMC and likelihood</td>
<td>Castoe</td>
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<tr>
<td>5-Feb-14</td>
<td>Models</td>
<td>Castoe</td>
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<tr>
<td>12-Feb-14</td>
<td>Coalescent Theory</td>
<td>Fujita</td>
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<tr>
<td>19-Feb-14</td>
<td>Gene Trees and Species Trees</td>
<td>Fujita</td>
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<tr>
<td>26-Feb-14</td>
<td>RADseq</td>
<td>Fujita</td>
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<tr>
<td>5-Mar-14</td>
<td>Species Delimitation</td>
<td>Fujita</td>
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<tr>
<td>12-Mar-14</td>
<td>NO CLASS</td>
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<tr>
<td>19-Mar-14</td>
<td>Population Genomics</td>
<td>Fujita</td>
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<tr>
<td>26-Mar-14</td>
<td>Read mapping</td>
<td>Fujita</td>
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<tr>
<td>2-Apr-14</td>
<td>Transcriptome Assembly</td>
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<td>9-Apr-14</td>
<td>Gene expression</td>
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<tr>
<td>16-Apr-14</td>
<td>Repeat Analysis</td>
<td>Castoe</td>
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<tr>
<td>23-Apr-14</td>
<td>Presentations</td>
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<tr>
<td>30-Apr-14</td>
<td>Presentations</td>
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Other Important University Policies:

**Grade Grievances:** Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate/graduate catalog.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the **Americans with Disabilities Act (ADA).** All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence. I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents’ Rule 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student
Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

**Student Support Services**: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

**Electronic Communication**: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at [http://www.uta.edu/oit/cs/email/mavmail.php](http://www.uta.edu/oit/cs/email/mavmail.php).

**Student Feedback Survey**: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit [http://www.uta.edu/sfs](http://www.uta.edu/sfs).

**Final Review Week**: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.
**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.