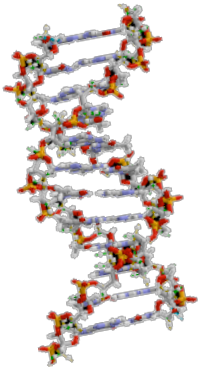
# Biol 3317 - Genomics
# Biol 5335 - Essentials of Genomics
# Fall 2013



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**Office Hours**:
Dr. Fujita – Wed, Fri 10-11 am
Dr. Castoe – Tues, Thurs, 2-3 pm

**Section Information**: Biology 3317 (Genomics) and Biology 5335 (Essentials of Genomics)

**Class time and place**: MWF 9:00-9:50 am, LS 424

**Course description**: This course will explore several aspects of genome biology, including the evolutionary principles that influence how genomes change through time, genome structure, and genome function. Emphasis will be given on how genome technology influences the way we do modern biology and how genomics influences the world around us.

**Student outcomes**: This course will prepare you with a general knowledge of genomes - how they evolve, how they function, and how they are structured. At the end of the course, you should understand: how evolutionary processes, such as natural selection and genetic drift, influence genome diversity; the way genomes are structured at multiple levels, including nucleotide, gene, and repetitive element compositions, to higher levels including three dimensional structures and karyotypes; how life history characteristics influence genomes, such as asexuality; how genomes function, including their regulation and transcriptional activity; and finally, how scientists sequence and analyze genomes today.

**Prerequisite**: You need to have a solid understanding of genetics.

**Textbook**: There is no required textbook. The *recommended* textbook is:

Gibson GG, Muse SV. 2009. A Primer of Genome Science, Third Edition. Sinauer Associates, Sunderland, MA.

It is available on Amazon.com for purchase or rent, and from Sinauer Associates.

**Course Website**: Blackboard (https://elearn.uta.edu)

**Description of major assignments and examinations**: This course will consist of two exams (one midterm and one final) and five homework assignments. Both exams will be take-home and will consist of several essay questions regarding material covered in lecture. The homework assignments will require access to the Internet and will involve the exploration of genomic data and critical evaluation of literature readings. These readings will be specified during lecture.

**Evaluation**:
Your grade will be based on one midterm (30%), homework (30%), and a final exam (40%). 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.

>=90% = A
89-80% = B
79-70% = C
69-60% = D
<60% = F

**Exam, homework, and credit policy**:
The midterm and final exam are due by the specified date on the schedule. Late exams will be penalized 10% *each late day*, including weekends. If you miss the midterm exam, your final exam will count for 70% of your grade *only if you provide written documentation explaining your absence from a professional* (e.g. doctor) *or jury duty*. Having to work is not a valid excuse. 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.

**Graduate students (Biol 5335)**: Graduate students will be required to write a short (2-page) research proposal on a genomics topic of your choice. A separate handout will provide details of this project. Your grade will be based on the midterm (20%), the final exam (20%), homework (10%), and the research proposal (50%). Late research proposals will be marked down 10% of your score for each late day (including weekends)

**Attendance**: Attendance will not be taken, but please note that any material covered in lecture is fair ground to be on exams, even if such material is not available in lecture notes.

**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. Reading will involve literature available on the Internet.

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.

**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.

**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, which is located down the stairs either (1) to the left of the door and through the doubledoors, or (2) to the right of the door and around the right corner at the hall intersection. 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.

| BIOL 3317/5335 - Genomics - Fall 2013 | | | | | |
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| **Lecture** | **Date** | **Day** | **Topic** | **Lecture** | **Professor** |
| **1** | 23-Aug-13 | Friday | Introduction | Administration, What is a genome? | Fujita/Castoe |
| **2** | 26-Aug-13 | Monday | Introduction | The Neandertal Genome | Fujita |
| **3** | 28-Aug-13 | Wednesday | Processes of Genome Evolution | Genomic variation | Fujita |
| **4** | 30-Aug-13 | Friday | Processes of Genome Evolution | Recombination and linkage disequilibrium, part 1 | Fujita |
| | 2-Sep-13 | Monday | | NO CLASS - Labor Day Holiday | |
| **5** | 4-Sep-13 | Wednesday | Processes of Genome Evolution | Recombination and linkage disequilibrium, part 2 | Fujita |
| **6** | 6-Sep-13 | Friday | Processes of Genome Evolution | Natural selection; **HW1 DUE** | Castoe |
| **7** | 9-Sep-13 | Monday | Processes of Genome Evolution | The coalescent: gene trees and species trees | Fujita |
| **8** | 11-Sep-13 | Wednesday | Processes of Genome Evolution | The coalescent: gene trees and species trees | Fujita |
| **9** | 13-Sep-13 | Friday | Processes of Genome Evolution | Genome complexity | Fujita |
| **10** | 16-Sep-13 | Monday | Essentials of Genome Structure | Isochores | Fujita |
| **11** | 18-Sep-13 | Wednesday | Essentials of Genome Structure | Noncoding DNA | Fujita |
| **12** | 20-Sep-13 | Friday | Essentials of Genome Structure | ENCODE | Fujita |
| **13** | 23-Sep-13 | Monday | Essentials of Genome Structure | Genome size variation | Castoe |
| **14** | 25-Sep-13 | Wednesday | Essentials of Genome Structure | Repetitive elements | Castoe |
| **15** | 27-Sep-13 | Friday | Essentials of Genome Structure | Evolution of repetitive elements; **HW2 DUE** | Castoe |
| **16** | 30-Sep-13 | Monday | Essentials of Genome Structure | Impacts of transposable elements on genomes | Castoe |
| **17** | 2-Oct-13 | Wednesday | Analysis of Genomes | Genome Sequencing Technologies | Castoe |
| **18** | 4-Oct-13 | Friday | Analysis of Genomes | Genome sequencing and assembly I | Castoe |
| **19** | 7-Oct-13 | Monday | Analysis of Genomes | Genome sequencing and assembly II | Castoe |
| **20** | 9-Oct-13 | Wednesday | Analysis of Genomes | Next-generation sequencing - Methods & Exp. Design I | Castoe |
| **21** | 11-Oct-13 | Friday | Analysis of Genomes | Next-generation sequencing - Methods & Exp. Design II | Castoe |
| **22** | 14-Oct-13 | Monday | Analysis of Genomes | Next-generation sequencing - Methods & Exp. Design III | Castoe |
| **23** | 16-Oct-13 | Wednesday | Analysis of Genomes | Next-generation sequencing - Methods & Exp. Design IV | Castoe |
| **24** | 18-Oct-13 | Friday | Analysis of Genomes | Databases; **MIDTERM EXAM DUE** | Fujita |
| **25** | 21-Oct-13 | Monday | Analysis of Genomes | Integrative Genomics (last chapter in Gibson and Muse) | Fujita |
| **26** | 23-Oct-13 | Wednesday | | Midterm Review | Fujita/Castoe |
| **27** | 25-Oct-13 | Friday | Special Topics in Genomics | Evolution of sex | Fujita |
| **28** | 28-Oct-13 | Monday | Special Topics in Genomics | Sex chromosome evolution | Fujita |
| **29** | 30-Oct-13 | Wednesday | Special Topics in Genomics | Human evolution; **HW3 DUE** | Fujita |
| **30** | 1-Nov-13 | Friday | Special Topics in Genomics | Phylogenomics | Fujita |
| **31** | 4-Nov-13 | Monday | Special Topics in Genomics | Phylogenomics | Fujita |
| **32** | 6-Nov-13 | Wednesday | Special Topics in Genomics | Conflicts in genomes | Fujita |
| **33** | 8-Nov-13 | Friday | Special Topics in Genomics | Small genomes: mitochondrial and chloroplast genomes | Fujita |
| **34** | 11-Nov-13 | Monday | Special Topics in Genomics | Demo: mitochondrial genome sequencing and analysis | Fujita |
| **35** | 13-Nov-13 | Wednesday | Special Topics in Genomics | HW4 Discussion | Castoe |
| **36** | 15-Nov-13 | Friday | Special Topics in Genomics | Central Dogma, ncRNAs and Proteomics; **HW4 DUE** | Castoe |
| **37** | 18-Nov-13 | Monday | Special Topics in Genomics | Epigenetic and Genomic Imprinting | Castoe |
| **38** | 20-Nov-13 | Wednesday | Special Topics in Genomics | Comparative genomics | Castoe |
| | 22-Nov-13 | Friday | | NO CLASS | |
| **39** | 25-Nov-13 | Monday | Special Topics in Genomics | Personalized genomics, GWAS, Rare Variants | Castoe |
| **40** | 27-Nov-13 | Wednesday | Special Topics in Genomics | Personalized genomics, GWAS, Rare Variants | Castoe |
| **41** | 29-Nov-13 | Friday | Special Topics in Genomics | Research Talk; **HW5 DUE** | Fujita |
| **42** | 2-Dec-13 | Monday | Special Topics in Genomics | Research Talk | Castoe |
| **43** | 4-Dec-13 | Wednesday | Special Topics in Genomics | Field trip: Genomics core facility | Jill Castoe |
| | 11-Dec-13 | Wednesday | FINAL EXAMS DUE @ 10:30 am | | |