This syllabus is a general representation of the course as previously offered and is subject to change.

BIOL 430 – Genome Evolution

General Course Syllabus (as of September 2019)

About the Course:

Course Description: A course Integrating molecular genetics and genomics with evolutionary biology. Emphasis is on the evolutionary dynamics of genomes and the evolutionary implications of recent discoveries in molecular genetics and genomics.

This course will study structural components of eukaryotic genomes with a focus on evolutionary aspects and implications. A central theme is that genomes are dynamic and change over evolutionary time. The course will be organized by topics with examples from humans, other vertebrates, and model genetic organisms such as Drosophila and Arabidopsis. The emphasis will be on recent discoveries and reading research literature. The course will be taught with a hybrid of lecture and small group discussions of research papers and literature review articles during many of the class periods; thus it's an integrated lecture-tutorial course.

Course Format: Lecture
Credits: 3
Prerequisites: One of BIOL 335, BIOL 336, or BIOL 338.

Course Learning Objectives:

By the end of this course, students should be able to:

- Achieve a strong working knowledge of concepts, principles, and recent discoveries in genome evolution.
- Relate concepts and discoveries in genomics and genome evolution to human disease and other applied situations.
- Evaluate how molecular evolution research is conducted, including how experiments are designed, how molecular techniques and computational analyses are used to perform the experiments, and how the data are interpreted.
- Utilize web resources in genomics and genome evolution (during computer lab sessions).

Textbooks and Additional Resources:

Reading: No textbook. Readings will consist of literature review articles primary research papers from scientific journals. The papers will be discussed during class in small groups of 4-5 students. Readings will be available on the course Canvas website.

Evaluation:

Assessment	Weight
Midterm exam	22%
Final exam	38%
Genomics computer project and write up	20%
Participation and small assignments	20%

Final exam: The exam is comprehensive, with an emphasis on material since the midterm exam (approximately 70%). Two-stage exams will be included, with a short component near the end where students discuss selected questions in small groups to receive immediate feedback on their answers.

Computer labs: There will be 2-3 computer labs. All lab exercises are web-based, and students can use their own laptops or tablets. Students will be introduced to genomics resources, such as genome browsers, genome project sites, gene expression sites and databases, and others.

Genomics computer projects and write-ups: After the computer labs on web resources in genomics, students will use the knowledge they gained to do a small project, outside of class, on a question they select that is related to the course topics. Students will write-up the project in scientific format (approximately 4-5 pages plus figures and tables). More details will be provided during the term.

Participation and small assignments: This includes participation in group discussions; preparedness for group discussions; attendance; short presentations in a discussion group; class participation, and paying attention during lecture. Assignments will be associated with the computer labs using web resources in genomics.

Schedule of Topics:

Lecture Schedule (sample from 2018W1):

Week	Lecture
1	Introduction, nucleotide substitution rates, origins of new genes
2	Mitochondrial and chloroplast genome evolution; transfers of mitochondrial and chloroplast genes to the nucleus
3	Horizontal gene transfer between species
4	Gene duplication, fates of duplicated genes, gene families, polyploidy
5	Transposable element evolution
6	Genome size evolution **Midterm Exam**
7	NCBI and other sequence databases

	Genomics computer lab #1
8	Genome and transcriptome sequencing approaches Genomics computer lab #2
9	Sequenced genomes and comparative genomics
10	Intron evolution and alternative splicing
11	Genomics computer lab #3 Evolution of cis-regulatory elements
12	Molecular basis of morphological evolution: regulatory and coding sequence mutations
13	Small RNAs and other non-coding RNAs Research in genome evolution

Course Policies:

- The mark distribution, indicated in the evaluation section above, will not be re-weighted for individual students.

University Policies:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.

UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.

UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.

UBC values academic honesty and students ae expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on the UBC Senate website.