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

BIOL 335 – Molecular Genetics

General Course Syllabus (as of August 2019)

About the Course:

Course Description: This course provides a solid understanding of isolation and identification of genes, analysis of gene structure; gene expression and its regulation in prokaryotes and in eukaryotes; developmental genetics.

Course Format: Lecture and Tutorial
Credits: 3
Prerequisites: One of: BIOL 233, BIOL 234, MICB 322, FRST 302

Course Learning Objectives:

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

- Explain how to use molecular genetic approaches to study biological questions.
- Describe how differential gene expression is regulated in development.
- Describe how information from mutations can be used to infer the role(s) of gene products and how the mutant genes are cloned.
- Use information from double mutant analysis to organize genes into signal transduction pathways.
- Describe basic principles and tools of recombinant DNA technology.
- Explain how DNA structure (including transposable elements) can be analyzed and manipulated to study what DNA encodes.
- Describe tools for genetic and genomic analysis such as the polymerase chain reaction, DNA sequencing (e.g. Sanger method), and complementation (rescue).
- Describe the relationship of DNA content to gene product function, phenotype, and evolution of organisms, as well as the relationship of genes to the overall complexity of the genome.
- Explain the importance of alternative splicing, and predict the effects of alternative splicing on RNA, protein, protein function, and the whole organism.
- Evaluate the relationship between gene number and cellular complexity.

Textbooks and Additional Resources:

No required textbook. Links to papers and online readings will be provided.

As an optional reference, a genetics, cell biology, or developmental biology textbook from a previous course may provide useful background information for selected course content/techniques.

Evaluation:

Assessment	Weight
Tutorials	10%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	50%

Schedule of Topics:

Sample topics from 2018W2:

Week	Lecture Topics
1	Introduction and overview of course Introduction to developmental genetics
2	Introduction to developmental genetics Control of gene expressing during development
3	Control of gene expression during development Determination: how do cells know to be different? Genetic analysis of Apoptosis
4	Genetics analysis of Apoptosis Control of cell division
5	Cancer Cytoplasmic determinants and pattern formation in Drosophila Pattern formation in Drosophila.
6	**Midterm Exam 1** Pattern formation in Drosophila embryogenesis: Maternal effect genes. Pattern formation in Drosophila embryogenesis: Zygotic patterning genes.
7	Pattern formation in Drosophila embryogenesis: Zygotic patterning genes. Recombinant DNA refresher. What is Reverse Genetics?
8	Whole Genome Sequencing and the implications of this knowledge. (gene content, comparative genomics, alternating splicing and gene networks.) Gene duplications.
9	Maximizing gene expression – promoters and alternative splicing.
10	How genetic study led to the discovery of a new level of development control – microRNA regulation.
11	**Midterm Exam 2** RNAi and its implications. Introduction to CRISPR-Cas technology and its applications.
12	Synthetic Biology – Building a genome (including regenesis). Bioethics and the new technologies to manipulate genomes.
13	Synthesis of topics and review

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.