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

BIOL 464 – Gene Regulation in Development

General Course Syllabus (as of November 2019)

About the Course:

Course Description: This course covers the role of genes in embryonic development, focused on the molecular mechanisms of various animal developmental programs and underlying signaling pathways. Emphasis is on tissue-specific expression patterns and the role of genetic networks in establishing cell types. Examples draw on studies using genetic model organisms such as C. elegans and Drosophila, applications in human diseases, and studies on plant development as appropriate.

Course Format: Lecture
Credits: 3
Prerequisites: BIOL 463

Course Learning Outcomes:

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

- Describe the history and the latest knowledge in the developmental genetics field and the signaling pathways that regulate development.
- Demonstrate critical reading and presentation skills.
- Think critically about how the latest technologies will be used in human therapy.

Textbooks and Additional Resources:

All course materials including lecture slides and papers for journal presentations will be available from the course website on Canvas (canvas.ubc.ca).

Grading Scheme:

Assessment	Weight
Quizzes	70%
Journal Club presentation	30%

At the end of each topic, students will complete:
Mini quizzes covering topics from both the lectures and journal presentations.

Journal presentations to discuss the latest findings in relevant research papers. Students will each present one figure and will be marked by the instructor and peers. The student's best presentation mark of the term will be applied towards their grade.

Schedule of Topics:

The course is divided into the following key sections:

1. Wnt signaling
    a. History
    b. Core components of Wnt/β-catenin signaling
    c. Wnt/β-catenin signaling in development and disease (asymmetric cell division, intestinal development)
    d. Non-canonical Wnt signaling
2. Notch signaling
    a. History
    b. Notch signaling
    c. Notch signaling in development (lateral inhibition, intestinal development, somitogenesis)
3. Non-coding RNAs
    a. microRNA (miRNA: heterochrony, mechanisms)
    b. RNA interference (RNAi: history and contribution of plant biology)
    c. CRISPR/Cas9
    d. Long-non coding RNA (lncRNA: Xist and X inactivation)
4. Left-right asymmetry
    a. Breaking symmetry by a 'F-factor'
    b. Asymmetric Nodal signaling by Reaction-Diffusion
5. Programmed Cell Death (PCD) and cell competition
    a. Discovery of PCD components in *C. elegans*
    b. PCD in development and diseases
    c. PCD and cell competition

Other topics addressed: cell polarity, stem cell maintenance, cell fate determination, cancer formation, skin pattern formation, convergent extension, muscular dystrophy.

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.