

LIFS 4090 DEVELOPMENTAL BIOLOGY

Fall 2023 Course Outline

Instructor: Prof. Yan YAN, Rm5511, 23585929, yany@ust.hk

Lecture Time: Tuesday 12:00-13:20, Thursday 12:00-13:20

Venue: Room 5583, Lift 29-30

General Course Description:

Developmental biology is traditionally about how an embryo is developed from a single zygote. But it really goes beyond that. It is also about how adult organisms maintain homeostasis, age, wear out, repair and regenerate. This course introduces the processes and underlying mechanisms of animal development. In the first part of the course, we will discuss classic embryonic development topics such as gametogenesis, gastrulation and pattern formation as examples to highlight principles governing animal development. The second part of the course will focus on current research topics in organogenesis, stem cell self-renewal and differentiation, growth control, regeneration and aging.

Key Learning Outcomes of the Course:

At the end of the course, students should be able to:

1. Be familiar with common operational principles, key molecular players and modulating factors in developmental biology.
2. Have the ability to comprehend and evaluate current literature on a variety of developmental biology contexts.
3. Solve specific biological questions framed under a developmental platform by
 - Integrating the developmental principles in specific model systems
 - Designing experiment logically
4. Integrate their prior knowledge of genetics, cell, biochemistry and molecular biology to analyze processes and mechanisms guiding the making of a functional life form.
5. Communicate their theoretical interpretation of experimental data and findings effectively in oral presentation and writing.

Course Format: Two 1.5-hour sessions per week. These will include lectures, student presentations and discussion periods. Grades will be based on midterm exam (40%), presentation (10%), and final exam (50%).

Key Reference book:

Lewis Wolpert, Principles of Development, 6th edition. Earlier versions are also good.

Prerequisite: Senior UG students and Graduate students with sufficient background on Genetics, Cell, Biochemistry and Molecular Biology.

Course Calendar:

Week	Topic
1	Introduction and Gametogenesis
2	Early embryo development I: Cell division
3	Early embryo development II: Pattern formation
4	Gastrulation I: Differentiation
5	Gastrulation II: Morphogenesis
6	Organogenesis I: Limb development
7	Organogenesis II: Eye, heart, lung, and organoid
8	Midterm review/exam
9	Organogenesis III: Neural development
10	Stem cells and regeneration
11	Growth control
12	Aging
13	Final review