LIFS3140
General Genetics
Fall Semester 2017

Lectures: Monday 16:30-17:50 and Friday 12:00-13:20
Venue: LT-J
Instructors: Dr. Eugene S.C. HUNG (EH) (course coordinator)
Prof. King L. CHOW (KC)
Prof. Danny C.Y. LEUNG (DL)
Prof. Hannah H. XUE (HX)

Tutorials:	**Section**	**Date & Time**	**Venue**	**Tutor**
	T1	Thu 11:00-11:50	Room 5560	Miss Jacqueline AW
	T2	Wed 15:00-15:50	Room 5508	Miss Stephanie DUAN
	T3	Thu 12:30-13:20	Room 5508	Miss Sabrina TAM
	T4	Wed 12:00-12:50	Room 5506	Mr. Bill HAU
	T5	Thu 15:00-15:50	Room 1505	Mr. Yuanbing JIANG

Textbook: *Genetic Analysis: An Integrated Approach* (2nd Edition), M.F. Sanders & J.L. Bowman, Pearson, 2016.

Course description:
This course with lecture and tutorials aims to introduce students to the fundamental principles and mechanisms of heredity and variation. Topics will include the basic principle of heredity, its chromosomal basis, molecular mechanisms of mutation, recombination, cytogenetics, somatic cell genetics, organelle genetics, viral genetics, bacterial and fungal genetics, cancer genetics, developmental genetics, quantitative and population genetics, genomics and bioinformatics, etc. The use of pro- and eukaryotic organism models for genetic analysis will be emphasised. Students taking this course are expected to acquire both qualitative and quantitative skills needed for genetic prediction. They are expected to utilize these genetic principles to explain genetic phenomena in nature, to solve simple genetic problems encountered in plant breeding program, animal husbandry, molecular diagnosis and medical applications.

Course Objectives:
On successful completion of this course, students are expected to be able to
1. apply the principles of transmission genetics to explain hereditary traits observed in natural or experimental situations and to design studies on the hereditary properties of notable traits;
2. explain the principles of biological phenomenon in genetic, cellular and molecular terms;
3. apply mathematical (quantitative) and biological (molecular) tools to evaluate complex biological phenomenon susceptible to the influence of abiotic factors;
4. evaluate the impact of advances in genetic studies on real-life phenomena and issues;
5. critically appraise genetic organization in the representative living species and evaluate its systematic characterization and possible application in the field of genetic studies.

Prerequisite: LIFS2040 Cell Biology *or* LIFS2210 Biochemistry I

Lecture (Date)	***Tutorial (Date)***	**Topic (Instructor)**	**Chapter**
1 (Sep 1)		Course introduction, Monohybrid intercross (EH)	2, 3
2 (Sep 4)		Pedigree analysis (EH)	2, 3
	1 (Sep 6/7)	*For Lectures 1 & 2 (EH)*	
3 (Sep 8)		Sex-linked inheritance (EH)	2, 3
4 (Sep 11)		Dihybrid intercross (EH)	2, 3
	2 (Sep 13/14)	*For Lectures 3 & 4 (EH)*	
5 (Sep 15)		Genetic linkage (EH)	5
6 (Sep 18)		Gene mapping in model organisms (EH)	5
	3 (Sep 20/21)	*For Lectures 5 & 6 (EH)*	
7 (Sep 22)		Gene mapping using large pedigrees (EH)	5
8 (Sep 25)		Gene mapping using small pedigrees & population data (EH)	
	4 (Sep 27/28)	*For Lectures 7 & 8 (EH)*	
9 (Sep 29)		Abnormalities in chromosome number (EH)	13
-- (Oct 2)		--	
	- (Oct 4/5)	--	
10 (Oct 6)		Abnormalities in chromosome structure (EH)	13
11 (Oct 9)		Gene structure: gene regulation in eukaryotes, and integration with genetics with molecular genetics (KC)	7, 8, 9, 10
	5 (Oct 11/12)	*For Lecture 11 (KC)*	

Mid-Term Exam [on Lectures 1-10 (EH)]: Oct 21, Saturday, 10:00-12:00, Venue: *TBA*

12 (Oct 13)		Extension of Mendelian genetics: more genetic interactions and regulatory actions; probability and modification of Mendelian ratios (KC)	3, 4, 19
13 (Oct 16)		Genetic regulation and mapping of pathways in biological process (KC)	10, 11, 19
	6 (Oct 18/19)	*For Lectures 12 & 13 (KC)*	
14 (Oct 20)		Non-threshold traits and continuous phenotypes: their multifactorial property (KC)	21
15 (Oct 23)		Quantitative genetics: analytical tools and application (KC)	21
	7 (Oct 25/26)	*For Lectures 14 & 15 (KC)*	
16 (Oct 27)		Forward genetics and recombinant DNA technology (DL)	16
17 (Oct 30)		Forward genetics and recombinant DNA technology (DL)	16
	8 (Nov 1/2)	*For Lectures 16 & 17 (DL)*	
18 (Nov 3)		Application of recombinant DNA technology and reverse	17
19 (Nov 6)		Epigenetics and practical definition of genes (DL)	15
	9 (Nov 8/9)	*For Lectures 18 & 19 (DL)*	
20 (Nov 10)		Epigenetics and practical definition of genes (DL)	15
21 (Nov 13)		Genomics: genetics from a whole-genome perspective (HX)	18
	10 (Nov 14)	*For Lectures 20 & 21 (DL/HX)*	
22 (Nov 17)		Genomics: genetics from a whole-genome perspective (HX)	18
23 (Nov 20)		Population genetics and evolution (HX)	22
	11 (Nov 22/23)	*For Lectures 22 & 23 (HX)*	
24 (Nov 24)		Population genetics and evolution (HX)	22
25 (Nov 27)		Review (HX)	--
	12 (Nov 29/30)	*For Lectures 24 & 25 (HX)*	

Final Exam [on Lectures 11-25 (KC, DL & HX)]: To be scheduled

Assessment Tasks (Weightings): **Mid-Term Exam (40 %)**
Final Exam (60 %)