

LIFS3140
General Genetics
Fall Semester 2022

Lectures: Monday and Wednesday 10:30-11:50 LT-C

Tutorials: Friday 9:30-10:20 LT-A

Instructors: Dr. Eugene HUNG (EH) (course coordinator), bohsc@ust.hk, Rm 5451
Prof. Danny LEUNG (DL), dcyleung@ust.hk, Rm 5519

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

Course description:

This course with lectures and tutorials aims to introduce students to the fundamental principles and mechanisms of heredity and variation. Topics will include the basic principles 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 prokaryotic 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

<u>Date</u>	<u>Topic (Instructor)</u>	<u>Chapter</u>
Sep 2 (Fri)	Course introduction (EH)	--
Sep 5 (Mon)	Law of segregation (EH)	2, 3
Sep 7 (Wed)	Pedigree analysis (EH)	2, 3
Sep 9 (Fri)	Pedigree analysis (EH)	2, 3
Sep 12 (Mon)	"Holiday – no session"	
Sep 14 (Wed)	Sex-linked inheritance (EH)	2, 3
Sep 16 (Fri)	Sex-linked inheritance (EH)	2, 3
Sep 19 (Mon)	Law of independent assortment (EH)	2, 3
Sep 21 (Wed)	Extension of Mendelian genetics (EH)	4
Sep 23 (Fri)	Extension of Mendelian genetics (EH)	4
Sep 26 (Mon)	Extension of Mendelian genetics (EH)	4
Sep 28 (Wed)	Quantitative genetics (EH)	21
Sep 30 (Fri)	Quantitative genetics (EH)	21
Oct 3 (Mon)	Quantitative genetics (EH)	21
Oct 5 (Wed)	Population genetics (EH)	22
Oct 7 (Fri)	Population genetics (EH)	22
Oct 10 (Mon)	Population genetics (EH)	22
Oct 12 (Wed)	Genetic linkage (EH)	5
Oct 14 (Fri)	Genetic linkage (EH)	5
Oct 17 (Mon)	Gene mapping using large pedigrees (EH)	--
Oct 19 (Wed)	Gene mapping using small pedigrees (EH)	--
Oct 21 (Fri)	Gene mapping using population data (EH)	--
Oct 24 (Mon)	Gene mapping using population data (EH)	--
Oct 26 (Wed)	Gene mapping in model organisms (EH)	5
Oct 28 (Fri)	Gene mapping in model organisms (EH)	5
Oct 29 (Sat) 14:00-17:00 Mid-Term Exam [on Sep 5 – Oct 19 lectures, 50% assessment]		
Oct 31 (Mon)	Application of recombinant DNA technology and reverse genetics (DL)	17
Nov 2 (Wed)	Application of recombinant DNA technology and reverse genetics (DL)	17
Nov 4 (Fri)	Application of recombinant DNA technology and reverse genetics (DL)	17
Nov 7 (Mon)	Forward genetics and recombinant DNA technology (DL)	16
Nov 9 (Wed)	Forward genetics and recombinant DNA technology (DL)	16
Nov 11 (Fri)	Forward genetics and recombinant DNA technology (DL)	16
Nov 14 (Mon)	Genomics: genetics from a whole-genome perspective (DL)	18
Nov 16 (Wed)	Genomics: genetics from a whole-genome perspective (DL)	18
Nov 18 (Fri)	Genomics: genetics from a whole-genome perspective (DL)	18
Nov 21 (Mon)	Epigenetics and practical definition of genes (DL)	15
Nov 23 (Wed)	Epigenetics and practical definition of genes (DL)	15
Nov 25 (Fri)	Epigenetics and practical definition of genes (DL)	15
Nov 28 (Mon)	Epigenomics (DL)	--
Nov 30 (Wed)	Epigenomics (DL)	--
Dec 7-19 (TBD) Final Exam [on Oct 21 – Nov 30 lectures, 50% assessment]		