

SEMESTER I & II
LSM1102 MOLECULAR GENETICS

Prerequisite: GCE 'A' level Biology or H2 Biology or equivalent or LSM1301 or LSM1301X

Workload: 47 lecture/tutorial hours + 3 continual assessment hours

The course will cover topics on (i) the patterns of inheritance, (ii) the discovery of genetic material, (iii) the molecular properties of genes, and (iv) genetic analysis of individuals and populations. This will include an in-depth understanding of Mendelian patterns of inheritance and variations that could occur due to multiple alleles, lethal genes, chromosomal variations, linkage, gene interaction and other genetic phenomena. Emphasis is placed on the understanding of the underlying molecular and biochemical basis of inheritance. Quantitative and population genetics will also be discussed with the emphasis of understanding the processes and forces in nature that promote genetic changes. Modern and current topics on molecular methods and new genetic technologies plus model organisms will also be introduced.

S/N	Topics	Lecture hours
1.	(1) Introduction; Overview of Genetics and Cellular Organization (2) Reproduction and Chromosome Transmission (Cellular Division: Mitosis and Meiosis) (3) Genetic transfer and mapping analysis in microorganisms (4) Chromosome organization, molecular structure and recombination (5) Non-Disjunction and Polyploidy Continual Assessment 1 (on Topics 1-5)	15 Wu Jinlu (Sem 1 & 2)
2.	(6) The genetic materials (7) How do cells read DNA? (8) Forward and reverse genetic methods (9) Advanced genetic technologies (genome editing, next generation sequencing, omics) (10) Model organisms in molecular genetics studies Continual Assessment 2 (on Topics 6-10)	15 Cynthia He (Sem 1) Liou Yih-Cherng (Sem 2)
3.	(11) Mendelian genetics + Sex Chromosomes and Sex Linkage (12) Modes of Inheritance and Pedigree Analysis (13) Variations to Mendelian Genetics, Penetrance, Expressivity, Pleiotrophy and Linkage (14) Population Genetics – Hardy-Weinberg Equilibrium, Mutation and Selection, Fitness, Factors Maintaining Polymorphism e.g., Over-dominance (15) Quantitative Genetics (16) Genetic Epidemiology Continual Assessment 3 (on Topics 11 onwards)	17 Chew Fook Tim (Sem 1 & 2)
Total Lectures/Tutorials: 47h		
Continual Assessments: 3h		
Total hours:		50h

TEXT BOOK (RECOMMENDED):

Genetics. Analysis & Principles by R J Brooker. Addison Wesley / McGraw-Hill

MODE OF ASSESSMENTS:

60% Continual Assessments/Class Tests/Assignments/Quizzes

40% Semester Exam

MODULE CO-ORDINATORS:

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LECTURERS:

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