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 Chromosome in Eukaryotes (2) Cellular Division: Mitosis and Meiosis; Non-Disjunction and Polyploidy (3) Chromosome in Prokaryotes, Genetic Transfer and Mapping Analysis in Microorganisms (4) Chromosome Compaction, Structure, Organization (5) Chromatin Remodeling and Gene Expression (6) Chromosome Recombination **Continual Assessment 1 (on Topics 1-6)**	15 Wu Jinlu (Sem 1 & 2)
2.	(7) Molecular structure of DNA and RNA; DNA Replication (8) Gene Transcription and RNA Processing (9) Translation of mRNA (10) Molecular genetic methods (genetic screening, recombinant and transgenic technologies, RNAi, reporter tagging etc.) (11) New genetic technology (genome editing, next generation sequencing, omics) (12) Model organisms in genetic studies **Continual Assessment 2 (on Topics 7-12)**	15 Cynthia He (Sem 1) Liou Yih-Cherng (Sem 2)
3.	(11) Mendelian Genetics – Terminologies, Mendelian Laws (12) Mendelian Genetics – Sex Linkage, Modes of Inheritance, Pedigree Analysis, Penetrance, Expressivity, Pleotrophy (13) Variations to Mendelian Genetics – Multiple Alleles, Epistasis (14) Variations to Mendelian Genetics – Lethal Genes, Linkage (15) Population Genetics – Hardy Weinberg Equilibrium, Allele Frequencies, Non-random Mating (16) Population Genetics – Mutation and Selection Forces, Maintenance of Genetic Polymorphism (17) Quantitative Genetics – Statistical Description of Quantitative Traits (18) Quantitative Genetics – Polygenic Inheritance, Heritability, Breeding, Heterosis **Continual Assessment 3 (on Topics 13 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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