Subject Description Form

Subject Code	ABCT4101
Subject Title	Advanced Molecular Biology
Credit Value	3
Level	4
Pre-requisite	Cell Biology, Molecular Biology
Objectives	In this subject, students will understand the interactions between the various systems of a cell, including the interactions between DNA, RNA and protein, as well as learning how these interactions are regulated.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) have an understanding of the basis of DNA damage, the effect of DNA damage of various cellular processes (b) appreciate and understand the importance of non-mendelian inheritance (c) have a basic understanding of the advanced gene regulatory mechanisms in eukaryotes (d) have a basic understanding of gene mapping and the associated methods
Subject Synopsis/ Indicative Syllabus	**DNA repair** - DNA damage response - Detection and repair of DNA damages - Regulatory elements during DNA damage response - Effect of DNA damage on DNA replication - DNA repair systems: nucleotide excision repair system, non-homologous end joining and homologous recombination repair systems. **Gene mapping in eukaryotes:** - RFLPs and SNPs (single nucleotide polymorphism), and GWAS (genome-wide association study) - parametric and non-parametric methods - linkage analysis **Non-Mendelian Inheritance** - Extranuclear inheritance (mitochondrial genome) - genomic imprinting - Mosaicism **Advanced Gene Regulation** - Epigenetics and Chromatin remodeling - Post-translational modification: acetylation, methylation, phosphorylation and sumoylation - Transcriptional regulation - siRNA and miRNA (micro RNA) - Protein turnover: the degradation process, the proteasome, ubiquitination and targeting

Teaching/Learning Methodology

The basic concepts of these molecular processes will be explained in lectures with the inclusion of interactive animations to aid the student to understand the more complex molecular events.

In tutorials, students will have discussion sessions to enhance their learning while probing questions and exercises will be used to gauge the learning outcomes of the students.

In laboratory sessions, students will have the chance to isolate total RNA from tissue samples and check its integrity.

Students should also reinforce their learning through self-learning from the textbook and suggested review and original journal articles.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d		
1. Attendance	5%						
2. Mid-term quiz	25%	√	√				
3. Laboratory report	15%			√	√		
4. Tutorials	5%	√	√	√	√		
5. Written assignment	10%			√	√		
6. Final examination	40%	√	√	√	√		
Total	100 %						

Assessments will consist of assignments, tests and written examination. These assessments are in line with the content of the interactive lectures and tutorials. All areas of assessments are focused on analytical and problem-solving skills on case-based studies in advanced molecular biology.

Students are required to attend at least 75% of scheduled sessions for the subject. Students fail to fulfill the attendance requirement will lose the 5% attendance score.

Student Study Effort Expected

Class contact:	
▪ Lectures ▪ Tutorials ▪ Laboratory sessions	22 Hrs. 13 Hrs. 4 Hrs.
Other student study effort:	
▪ Self study	78 Hrs.
Total student study effort	117 Hrs.

Reading List and References

Lewin, Krebs, Goldstein and Kilpatrick Lewin's Essential Genes Jones & Bartlett Learning 2010
Lewin Krebs, Goldstein and Kilpatrick Genes X Jones & Barlett Learning 2008.