



MMM/WIN: 516001

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY**SPHBST AT THE SCIENCE COMPLEX - SPD****COURSE OUTLINE****Department: MLST****Programme: Bachelor of Science in Nursing Sciences (Direct Entry)****Course Code: BML 222 Course Title: MOLECULAR BIOLOGY AND GENETICS CF: 4.0****Year of Study: Year I****Academic Year: 2018/2019****Trimester: II****Date: 15th MARCH 2019****2. Introduction**

This course aims to expose the learner to advanced knowledge, principles and skills of cell biology and genetics biology as well as molecular biology. It intends to enable students perform investigations on nucleic acids and related molecules. It also provides the student with the ability to critically evaluate current research on the structural organization, expression, diagnostic investigation and clinically-related manipulation of genomes.

3. Learning outcomes**By the end of the course the learner will be able to:**

1. Describe principles and mechanisms involved in Mendelian inheritance, nucleic acid architecture, the central dogma, mutations and cell biology and genetics.
2. Describe the microscope technology, the cell theory, cell ultrastructures, cell organelles and their functions.
3. Describe cell division mechanism and chromosomal changes during cell division, the regulation of gene expression and its contribution to phenotypic variation.
4. Describe principles and steps involved in protein synthesis; transcription and translation, recombinant DNA and genetics techniques and applications of such knowledge in transfection and gene therapy
5. Investigate the various nucleic acid processes, their mechanisms and phenotypic manifestations by applying knowledge of pertinent concepts, principles and methods.
6. Perform DNA extraction and other molecular biology techniques like PCR, used for disease diagnosis.

4. Learning / Teaching Strategy

Lectures, demonstrations, practical, group discussions and class presentations.

5. Topic outline

WK	TOPIC	ACTIVITIES
1	Introduction: Introduction to Cell biology and Genetics, Terminologies in Cell, molecular biology and Genetics, Mendelian Genetics, Proteins and Nucleic acids, Cell Growth, Division and Cell Cycle	Lectures, Group work
2	The cell theory Microscope technology, cell ultrastructures, cell organelles and their functions. Cell division mechanisms and chromosomal changes during cell division	Lectures, discussions
3	Nuclear Structure and DNA function: DNA discovery and structure, Nucleobase classification, bonding interactions, supercoiling, replication. RNA, types of RNA, RNA genomes.	Lectures, demonstrations
4	The central dogma of Mol. Biology: Information transfer, Protein biosynthesis; Transcription, Post Transcriptional splicing and Modification, TFs, Translation, Post translational modification.	Lectures, discussions
5	Mutations: Introduction, Mutagenesis, Classification of Mutations, DNA Damage and Repair Mechanisms.	Lectures, discussions
6-7	Practical: DNA extraction	Lectures, discussions Practical
	CAT ONE	Lectures, discussions
8	Transposition, Allele frequencies, Assortative mating, Genetic Polymorphism, Molecular Evolution	Lectures, discussions
9	Regulation of Gene Expression, Regulation of Transcription, Nucleic Acid Analysis: DNA extraction and quantification, Gel Electrophoresis, Nucleic Acid hybridization.	Lectures, discussions PCR Practical
10	PCR: Introduction, Principles and Mechanisms Involved. Reaction Description and PCR Variants	Lectures,
	CAT TWO	Lectures, discussions
11	Recombinant DNA and Genetics Techniques: Plasmids and other vector types, Expression of Recombinant DNA. RFLP, RPD, AFLP-PCR	Lectures, discussions
12	Applications of Recombinant DNA Technology, Properties of Organisms Containing Recombinant DNA, Controversies Surrounding Recombinant DNA Technology.	Lectures, Presentations
13-14	Molecular Transfection: Chemical and Non-chemical Transfection Methods, Gene Therapy and Molecular Nanotechnology Emerging Trends in CMBGs	Lectures, discussions Presentations
15	End of Semester Examinations	
16	End of Semester Examinations	

1. Course Requirements

(a) Attendance

Attendance of lectures, and other scheduled classes/practical sessions is mandatory for all students. Any absence will prohibit the student from taking continuous assessment (CA) and end of trimester examinations.

