MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF PUBLIC HEALTH, BIOMEDICAL SCIENCE AND TECHNOLOGY

COURSE OUTLINE
Department: Medical Laboratory Science and Technology
Program: Medical Laboratory Science

Course code: BML 411 **Course Title: MOLECULAR DIAGNOSTICS**
Year of Study: Three Semester One Academic Year 2019/2020
Date: SEP 2019 -DEC 2019

1. **Introduction**
   The course is intended to enable students to master the concepts of molecular diagnostics
2. **Course Purpose**

This course provides an introduction to Molecular Diagnostics and its application in a variety of medical, clinical and science disciplines. It aims at giving an understanding of the Molecular Diagnostics tools used in molecular biology with an emphasis on medical application.

3. **Learning outcomes**

By the end of the course the learner will be able to:

1. Analyze microorganisms using Bright field, Dark field, Phase contrast and Fluorescent microscopy.
2. Separate compounds from crude extracts using TLC.
3. Separate DNA, proteins using electrophoretic techniques.
4. Determine molecular weight analysis of DNA and proteins using gel documentation.
5. Isolate DNA and plasmid.
6. Perform RAPD finger printing using PCR.
7. Perform southern and western blotting and hybridization techniques.
8. Perform ELISA test.

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TEACHING-LEARNING STRATEGIES

- Overview Lectures
- Group work and presentations
- Small-group Tutorial Discussions
- Individual reading assignments
- Self-directed Learning

4. Topic Outline

Week	Topic	Activities
1	Diagnosis of microbial diseases - Collection, transport and preliminary processing of clinical pathogens.	Lectures, Group work
2	Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.	Lectures, discussions, practicals
3	Modern methods of microbial diagnosis. Quality control, GMP GLP, and records	Lectures, discussions
4	Microscopy and Related Techniques - Light Microscopy : Microscopic optics, components of microscopes. Basic principles and method of Bright field, Dark field, Phase contrast. Fluorescence, Polarization and confocal microscopes	Lectures, discussions
5	CAT ONE	CAT
6	Applications of various types of microscopy such as immunofluorescence - In situ hybridization. Electron Microscopy - Principle, Techniques and applications of Transmission Electron microscope (TEM) and Scanning Electron Microscope (SEM),	Group work, lectures, discussion.
7	Principles & Applications of Chromatographic Techniques : Adsorption - Ion exchange and gel permeation - affinity chromotography for separation of compounds including GC and HPLC	Lectures, discussions, practicals
8	Electrophoresis Techniques - protein - nucleic acid - immuno - two dimensional electrophoresis.	Lectures, discussions
9	CAT TWO	CAT
10	Concept of gene and Gene regulation - Organization of gene in prokaryotes.	Lectures, discussions
11	Operon concept, lac and Trp operons, promoters and repressors, regulation of gene expression – Transcriptional control - promoters, terminators, attenuators and anti terminators	Lectures, discussions
12	Induction and repression; the lac operon - catabolite repression; Biosynthesis; trp operon - upstream activator sequences and enhancers, two component regulatory systems	Lectures, discussions
13	Translational control - ribosome binding, codon usage, antisense RNA;	

14	post-translational modification (epigenetics).	CAT
15	End of Semester Examinations	Exams
16	End of Semester Examinations	Exams

5. Course Requirements

a) Attendance

Attendance of lectures and other scheduled classes/practical/laboratory sessions is mandatory for all students. Any absence will prohibit the student from taking CAT and examinations.

b) Methods of Assessment (For university wide courses; CATs 40%, Exam 60%)

6. Continuous Assessment Tests (CATs):

Written CAT (At least 2 CATs, one of which has to be a sit-in)	20%
Practical CAT (Can be sit-in or practical marked reports)	20%
Final Examination (Written)	60%
Pass Mark	50%

7. Instructional Resources

1. Susan Barnum (2004) Laboratory: A Brief Introduction. Wadsworth Publishing. (2nd Edition) ISBN 0-534-49296-7.
2. Judith Pongrac Habil and Mary Keen (2009). Medical Laboratory, ie. Churchill Livingstone Elsevier. ISBN 978-0-08-045135-0.

8. Signing and Approval

Prepared by Course Lecturer:

Name: Maloba Geofrey Sign…….Date……

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Issued by Curriculum Coordinator:

Name: Dr. Mustafa Barasa Sign…….Date……

Approved by COD:

Name: Fidelis Mambo
Sign……..Date……