



**Course Title:** Clinical pathology and Molecular Diagnostics

**Course Code:** BIOT315

**Credit Units:** 04

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3	0	2	0	04

**Course Objectives:**

The course is designed to give students a prospective of the molecular and cellular aspects of pathogenesis and disease symptoms in an integrated manner. The student will understand the concept of disease from a multi-dimensional perspective and research ethics by diagnosis of disease

**Pre-requisites:** Human physiology, Recombinant DNA Technology, Molecular Biology

**Student Learning Outcomes:** At the end of this course students will be able to;

- Describe the mechanisms of the origin and development of disease and its manifestations in the form of molecular, chemical and physiological changes.
- Apply methodologies of laboratory diagnostics to relevant states of health.
- Awareness of characteristics signs of clinical manifestations as well as to comprehend and analyze the concept of disease management.

**Course Contents/Syllabus- Theory:**

	Weightage (%)
<b>Module I Fundamentals of Molecular Diagnostics</b>	<b>20</b>
General approach to clinical specimens (Blood, urine, spinal fluid, saliva synovial fluid, Amniotic fluid, Bronchoalveolar fluids, cells and tissues biopsy) Sample collection, method of collection, transport and processing of samples. Selection & Interpretation of Lab Procedure, Good Laboratory Practices. Different Levels of Biosafety, BIAS management, Interpretation of results.	
<b>Module II Methods in Molecular Diagnostics</b>	<b>20</b>
Nucleic acid based method (Primer Designing, PCR, real time PCR, multiplex PCR, Nested PCR, Reverse transcriptase PCR, RFLP, RAPD, DNA sequencing and Fingerprinting, Microarray, In situ hybridization), Applications of PCR based techniques in detection of viral and bacterial pathogens through PCR. RAPD for animal and plants- PCR in forensic science, Multiplex PCR- Determination of Paternity- Human identification and sex determination, 3D Tissue	

Printing.	
<b>Module III Immunodiagnostics</b>	<b>20</b>
Florescent labeling (HRP and FITC tagging), Antibody Production, ELISA, RIA, FACscan, ICC (Immunocytochemistry), Immunohistochemistry, FISH, Western Immunoblotting and Enhanced Chemiluminescence with reference to specific examples of the diseases.	
<b>Module IV Basic Cellular aspects of Clinical pathology</b>	<b>20</b>
Injury, Free radical induced Injury, Normal response to injury, Morphology of cell and tissue injury, Inflammation (acute and chronic), Cell death (Necrosis, apoptosis, autophagy), Tissue repair (regeneration, healing by first and second intention, Fibrosis, Pathological aspects of repair)	
<b>Module V Clinical symptoms and pathology of Diseases</b>	<b>20</b>
General Principle of cause and effect relationship in diseased conditions (acquired/congenital/infectious/non-infectious diseases (Atherosclerosis, Congenital heart diseases, pneumonia, occupational lung diseases, encephalitis, multiple sclerosis, Alzheimer's disease).	
<b>List of Experiments:</b>	
<ul style="list-style-type: none"> <li>• DNA isolation from peripheral blood, Nucleic acid quantification spectrophotometrically</li> <li>• DNA isolation and quantitation from buccal swabs</li> <li>• Isolation of DNA from bacterial source and Restriction enzyme digestion followed by agarose gel electrophoresis</li> <li>• Polymerase chain reaction (PCR) for a given clinical sample</li> </ul>	

- Histocompatibility testing
- Immunohistochemistry

**Pedagogy for Course Delivery:**

Lectures: 39

Tutorial: 0

Presentation/ Seminar: 4

Class Test: 02

Total: 45

**Lab/ Practical details, if applicable:**

Tutorial: 0

Practical: 28

Class Test: 01

Viva: 01

Total: 30

**Assessment/ Examination Scheme:**

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	25	100

**Theory Assessment (L&T):**

Continuous Assessment/Internal Assessment							End Term Examination
Components (Drop down)	Class Test 1	Class Test 2	Home Assignment	Presentation/ Seminar	Attendance		
Weightage (%)	5	10	10	-	5		70

**Lab/ Practical/ Studio Assessment:**

	Continuous Assessment/Internal Assessment	End Term Examination

<b>Components (Drop down)</b>	<b>Performance</b>	<b>Lab record</b>	<b>viva</b>	<b>Attendance</b>	<b>Lab record</b>	<b>Performance</b>	<b>Viva</b>	<b>Total</b>
<b>Weightage (%)</b>	15	5	5	5	10	50	10	100

**Text & References:**

- Kumar et al (eds): Robbins and Cotran Pathologic Basis of Disease, Elsevier Saunders, 9<sup>th</sup> edition, 2008, ISBN 978-1-4377-1781-5.
- Basic Medical laboratory Techniques, 4<sup>th</sup> Edition by Barbara H Estridge, Anna P Reynolds & Norma J Walters, ISBN-13:9780766812062