



# AMITY UNIVERSITY

— UTTAR PRADESH —

**Course Title:** Clinical Biochemistry

**Course Code:** BIOT305

**Credit Units:** 04

L	T	P/ S	SW /F W	TOTAL CREDIT UNITS
03	-	02	-	04

## Course Objectives:

The objectives of this course are to demonstrate, through lectures and other lab based methods, how basic biochemistry and analytical chemistry can be applied to medical diagnosis, treatment and management. It will use examples within human system to demonstrate clinical disorders, the biochemical consequences of particular disease process and the response to therapy.

**Pre-requisites:** Biochemistry and Human Physiology

## Student Learning Outcomes:

After completing this course, the student will be able to:

- Examine and identify acid-base balance and the regulatory mechanisms within the body to include the analyte, physiology involved, and clinical significance. Students will be able to calculate and interpret the anion gaps from different case scenarios.
- Describe and Identify inborn defects in metabolism and correlate them with deficiency of key metabolic enzymes, the enzymes assayed in the clinical laboratory, their common methods of analysis, and their clinical significance.
- Relate laboratory results to clinical diagnosis and relationship to heart, liver, kidney and pancreas function.
- Describe and explain the role of liver function in bilirubin metabolism and identify the tests used for bilirubin analysis, and relate laboratory results to clinical diagnosis.
- Identify and summarize the use of standard precautions applied in clinical laboratory and during the collection and processing of biological specimens for analysis.
- Demonstrate, by performance, the basic laboratory mathematics necessary to perform tests, make dilutions, and prepare solutions.

- Perform various biochemical tests to determine glucose, lipids, creatinine and albumin in blood.
- Correlate laboratory test results with common diseases or conditions.

**Course Contents/Syllabus- Theory:**

<b>Module</b>	<b>Weightage(%)</b>
<p><b>Module I:</b></p> <ul style="list-style-type: none"> <li>• <b>Acid-Base balance:</b> Basic concepts of acids, bases, indicators &amp; buffer, their application in laboratory; Blood buffers &amp; Physiological buffers. Anion Gap, Disturbance in acid base balance - metabolic acidosis, metabolic alkalosis, respiratory acidosis, &amp; respiratory alkalosis</li> <li>• <b>Water and electrolyte balance:</b> Water and Electrolytes distribution, Plasma osmolality, Regulation and Disturbance of fluid and electrolytes.</li> </ul>	<b>20</b>
<p><b>Module II:</b></p> <ul style="list-style-type: none"> <li>• <b>Disorders of carbohydrate metabolism:</b> Overview of carbohydrate metabolism, Normal sugar level in blood, renal threshold and regulation of blood glucose concentration, Glucose Tolerance Tests; Inborn error - Fructosuria, pentosuria, Galactosemia, and Glycogen storage diseases.</li> <li>• <b>Disorders of Aminoacid Metabolism:</b> Over view of Aminoacid metabolism, Disorders of sulphur containing and aromatic aminoacids, Disorders of urea cycle.</li> <li>• <b>Disorders of Lipid Metabolism:</b> Over view of Lipid metabolism, Hyperlipoproteinemia - Type I, II, III, IV, V and alpha-lipoproteinemia, Lysosomal storage disorders, Gaucher, Tay Sachs's diseases, and Niemann- Pick disease.</li> <li>• <b>Disorders of Purine and Pyrimidine metabolism:</b> Over view of Purine and pyrimidine metabolism, Disorders of purine metabolism: Hyperuricemia and Gout; Disorders of Pyrimidine metabolism: Orotic aciduria.</li> </ul>	<b>35</b>
<p><b>Module III:</b></p> <ul style="list-style-type: none"> <li>• <b>Gastric, Pancreatic and Intestinal Functions:</b> Tests for gastric function- The Insulin Stimulation test, determination of Gastrin in serum and Tubeless gastric analysis. Pancreatic function tests, serum amylase and lipase. Test used in the diagnosis of malabsorption- determination of total faecal fat (Fat balance test).</li> <li>• <b>Liver disease and liver function tests:</b> Bilirubin metabolism, jaundice and its types, Liver function tests, Estimation of conjugated and total bilirubin in serum, Pre hepatic, hepatic and post hepatic jaundice, Serum enzymes in liver disease- serum Transaminases- SGPT, SGOT and Lactate dehydrogenases (LDH).</li> </ul>	<b>35</b>

<ul style="list-style-type: none"> <li>• <b>Kidney Function test:</b> Glomerular filtration rate and its clinical importance, Clearance tests- Inulin clearance test, Creatinine clearance and Urea clearance tests, renal blood flow and filtration fraction.</li> </ul>	
<b>Module IV:</b> <ul style="list-style-type: none"> <li>• <b>Clinical enzymology:</b> Diagnostic significance of enzyme activity in body fluids in various disease states involving heart, muscle, liver and kidneys.</li> <li>• <b>Quality assurance:</b> Quality control of clinical investigations, Automation in clinical biochemistry laboratory, Laboratory organization management and maintenance of records.</li> </ul>	<b>10</b>
<b>List of Experiments:</b> <ul style="list-style-type: none"> <li>• Collection and preservation of biological fluids.</li> <li>• Urinalysis: Characteristics of normal urine, Appearance, Specific gravity, Microscope examination, Qualitative analysis of Normal and abnormal constituents of urine.</li> <li>• Estimation of blood glucose.</li> <li>• Estimation of Serum Albumin, Globulin Fraction, total protein and AG Ratio.</li> <li>• Estimation of Serum Urea, Creatinine, Cholesterol, total lipids, Bilirubins, Uric acid</li> </ul>	

**Pedagogy for Course Delivery:**

Lectures: 40  
 Tutorial: 0  
 Presentation/ Seminar: 3  
 Class Test: 2  
 Total: 45

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

Tutorial: 4  
 Practical: 26  
 Total: 30

**Assessment/ Examination Scheme:**

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

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

**Lab/ Practical/ Studio Assessment:**

	<b>Continuous Assessment/Internal Assessment</b>				<b>End Term Examination</b>			
<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>	10	10	5	5	10	40	20	100

**Text & References:**

- Textbook of Biochemistry for Medical Students / Revision Exercises Based on Textbook of Biochemistry, DM Vasudevan, JP Medical Ltd, 2010. ISBN 978-93-5025-016-7
- Harper's Biochemistry, Twenty-fifth Edition, by Robert K. Murray, Daryl K. Granner, Peter A. Mayes, and Victor W. Rodwell, Appleton and Lange, Norwalk, CT, 2000. ISBN:0-8385-3684-0
- WJ Marshall. Clinical Chemistry, 5th edn. 2004, Mosby. ISBN 0-723-43328-3.