



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-I(M.Sc.)

Subject: Clinical Laboratory Biochemistry- MSCMT11501

Type of course: Major

Prerequisite: Students should have a Basic knowledge of biochemistry, human physiology, and lab techniques is required.

Rationale: This subject helps students understand and apply biochemical tests for diagnosing and monitoring diseases in clinical settings.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No.	Activity Learning Activity	Marks
1	Reaction Simulation: Simulate antigen-antibody reactions and upload observations. Upload it into GMIU web portal.	10
2	Vaccine Debate: Participate in vaccine roleplay and upload report/video. Upload it into GMIU web portal.	10
3	Disorder Analysis: Analyze immune disorder cases and upload diagnosis. Upload it into GMIU web portal.	10
4	Poster Preparation: Students have to prepare poster on Hormonal Biochemistry and need to upload it into GMIU web portal.	10
5	Flow Cytometry: Rotate flow cytometry stations and upload report. Upload it into GMIU web portal.	10
Total		50



Course Content:

Unit No	Course content	Hrs	% Weightage
1	Fundamentals of Clinical Biochemistry and Laboratory Operations <ul style="list-style-type: none"> • Introduction to Clinical Biochemistry: Scope, objectives, and significance in medical diagnostics • Principles of Clinical Biochemistry Laboratories: Organization, layout, safety, and ethics • Specimen Collection: Types of specimens, collection techniques, anticoagulants, and preservatives • Handling and Storage of Biological Samples: Pre-analytical variables, transport, and stability • Laboratory Information Systems (LIS): Data handling, digital records, and integration 	15	25
2	Metabolic Disorders and Functional Organ Biochemistry <ul style="list-style-type: none"> • Carbohydrate Metabolism Disorders: Pathophysiology, diagnostic markers, and interpretation (e.g., Diabetes Mellitus) • Lipid Metabolism and Lipid Profile: Hyperlipidemia, atherosclerosis, and biochemical markers • Renal Function Tests (RFT): Urea, creatinine, uric acid, clearance tests, and clinical relevance • Liver Function Tests (LFT): Bilirubin, enzymes (ALT, AST, ALP), proteins, and jaundice differentiation • Thyroid Function Tests: T3, T4, TSH assays, hyper- and hypothyroidism • Acid-Base Balance: Buffer systems, blood gas analysis, and metabolic disorders • Electrolyte Analysis: Sodium, potassium, chloride, calcium, and related pathologies 	15	25
3	Enzymes, Proteins, and Hormonal Biochemistry in Clinical Diagnosis <ul style="list-style-type: none"> • Clinical Enzymology: Enzyme kinetics, diagnostic enzymes (CK, LDH, Amylase, etc.) • Plasma Proteins and Protein Electrophoresis: Albumin, globulins, and diagnostic significance • Hormonal Assays: Principles, techniques (RIA, ELISA), and clinical interpretation Reproductive and Adrenal Hormones: Estrogen, progesterone, cortisol, ACTH, and disorders • Interpretation of Biochemical Profiles: Diagnostic reasoning in multi-hormonal and enzyme disorders 	15	25



4	Quality Assurance and Clinical Correlation in Biochemistry	15	25
	<ul style="list-style-type: none"> • Quality Control in Biochemical Testing: Internal and external QC, Levey-Jennings charts • Quality Assurance and Accreditation: ISO standards, NABL, CAP, and good laboratory practices • Reference Ranges: Establishment, biological variability, and use in interpretation • Case-based Clinical Biochemistry: Integration of lab results with clinical scenarios • Ethical and Legal Aspects in Clinical Biochemistry: Confidentiality, consent, and report validation 		

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage (%)	30%	30%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Elucidate the principles, practices, and digital systems used in clinical biochemistry laboratories.
CO2	Interpret biochemical test results related to metabolic and organ function disorders.
CO3	Analyze the clinical significance of enzymes, proteins, and hormones in disease diagnosis.
CO4	Utilize quality assurance principles and interpret biochemical data in clinical case scenarios.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

- [1] Biochemistry and Clinical Pathology by Dr. S.B. Bhise
- [2] Lab Tech Clinical Biochemistry by Sathya Publishers.
- [3] Clinical Biochemistry by Nanda Maheshwari.
- [4] Practical Clinical Biochemistry by Prithvi Books.
- [5] Practical Clinical Biochemistry by dnamart.in.