

Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	1BSL01
Course Title	:	Clinical Chemistry
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Clinical Chemistry course mentioned earlier are typically designed for students who have a foundational understanding of certain scientific and laboratory concepts. Here are some common prerequisites that students should ideally have before enrolling in such a course: Basic chemistry, Biology, Mathematics, Laboratory Skills, Biochemistry.
Course Objective	:	These objectives provide a clear framework for what students should aim to achieve in each unit of the course, helping them develop a comprehensive understanding of clinical chemistry and its practical applications in healthcare.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Understand the fundamental principles of clinical chemistry and its role in patient diagnosis and monitoring.
	CO2	Application of proficiency in immunoassays and their utility in detecting specific analytes in clinical samples.
	CO3	Analyze blood chemistry components and their significance in health and disease. Interpret the results of liver function tests and understand their clinical implications.
	CO4	Evaluate cardiac biomarkers and their importance in diagnosing cardiac conditions.
	CO5	Understand tumor markers and their relevance in cancer diagnostics and monitoring.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	2	4	50	25	50	25	150

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P – Practical, C – Credit, SEE – Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With Cos
1	Introduction to Clinical Chemistry Overview of clinical chemistry and its importance in healthcare. Basic laboratory safety and techniques. Quality control and assurance in clinical chemistry. Specimen collection and handling.	10	22.22%	CO1
2	Analytical Techniques Principles of spectrophotometry and photometry. Chromatography techniques (e.g., HPLC, GC). Electrochemistry in clinical analysis (e.g., ion-selective electrodes). Immunoassays and their applications.	11	24.44%	CO2
3	Clinical Analytes Blood chemistry and its components (e.g., glucose, lipids, electrolytes). Liver function tests (e.g., ALT, AST, bilirubin). Renal function tests (e.g., creatinine, BUN). Cardiac biomarkers (e.g., troponin, CK-MB).	10	22.22%	CO3
4	Special Topics in Clinical Chemistry Endocrine and hormonal assays (e.g., thyroid function tests, insulin). Tumor markers and cancer diagnostics. Toxicology and drug monitoring. Emerging trends and technologies in clinical chemistry.	14	31.11%	CO4 CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	-	40	20	20	20	-

NOT: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Demonstrate proper techniques for blood and urine specimen collection, including venipuncture and urine sample preparation.	02



2	Conduct safety drills and simulate emergency situations in the laboratory to ensure students are well-versed in laboratory safety protocols.	02
3	Perform quality control tests on laboratory equipment and reagents to understand the importance of maintaining accuracy in clinical testing.	02
4	Set up scenarios where students must correctly handle and transport various specimens to the laboratory to prevent pre-analytical errors.	02
5	Use a spectrophotometer to measure the absorbance of different solutions and calculate concentrations of analytes.	02
6	Conduct chromatography experiments, such as thin-layer chromatography, to separate and analyze components in mixtures.	02
7	Perform experiments with ion-selective electrodes to measure concentrations of ions in solutions.	
8	Run immunoassays using mock patient samples to detect specific biomarkers and antigens.	02
9	Analyze blood samples for common analytes like glucose, cholesterol, and electrolytes using clinical chemistry analyzers.	02
10	Carry out liver function tests on serum samples, including the measurement of ALT, AST, and bilirubin levels.	02
11	Determine renal function by analyzing serum samples for creatinine and blood urea nitrogen (BUN).	02
12	Analyze mock serum samples for cardiac biomarkers like troponin and CK-MB to diagnose cardiac conditions.	02
13	Perform hormonal assays on serum samples to measure hormones like thyroid hormones or insulin.	02
14	Set up experiments to detect tumor markers like PSA or CA-125 in serum or tissue samples.	02
15	Conduct toxicology screenings using mock urine samples to identify common drugs and toxins.	02

Major Equipment/Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Centrifuge
2	Microscope
3	Specimen Transport containers
4	Safety cabinet
5	Spectrophotometer
6	Chromatography
7	Electrochemical analyzer
8	Bilirubinometer
9	Creatinine Analyzer
10	Troponin Assay kit
11	Tumor Marker Assay kit
12	Toxicology Screening kit
13	Thyroid Hormone Assay kit
14	Weight balance

Suggested Learning Websites

Sr. No.	Name of Website
1	https://archive.nptel.ac.in/courses/102/106/102106094/
2	https://archive.nptel.ac.in/courses/102/103/102103097/

Reference Books

Sr. No.	Name of Reference Books
1	A Manual of Laboratory Techniques, MIN, ICMR Publications
2	Introduction to Genetic Analysis" by Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll, and John Doebley.
3	Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox.
4	Introduction to Genetic Analysis" by Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll, and John Doebley.
5	Genetics: A Conceptual Approach" by Benjamin A. Pierce