



**Gyanmanjari**  
Innovative University

Course Syllabus  
Gyanmanjari institute of medical science and  
health care  
Semester-I

**Subject:** Clinical Biochemistry-PGDMT11501

**Type of course:** Major

**Prerequisite:** Basic knowledge of medical biochemistry

**Rationale:** To critically review the elements of laboratory services that result in inappropriate ordering of clinical chemistry tests and the efficacy of corrective interventions.

**Teaching and Examination Scheme:**

| Teaching Scheme |   |   | Credits | Examination Marks |              |    |                 |     | Total Marks |
|-----------------|---|---|---------|-------------------|--------------|----|-----------------|-----|-------------|
| CI              | T | P |         | C                 | Theory Marks |    | Practical Marks |     |             |
|                 |   |   | ESE     |                   | MSE          | V  | P               | ALA |             |
| 4               | 0 | 2 | 5       | 60                | 30           | 10 | 20              | 30  | 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       | Active Learning Activities  | Marks     |
|--------------|---|-----------|
| 1            | <b>Presentation</b><br>Students need to prepare presentation individually and upload on Moodle.                     | 10        |
| 2            | <b>Assignment</b><br>Students make assignments individually and upload on Moodle.                                   | 10        |
| 3            | <b>Medical Training</b><br>Students will be trained about pathology laboratory and photos will be upload on moodle. | 10        |
| <b>Total</b> |   | <b>30</b> |



**Course Content:**

| Sr. No | Course content  | Hrs | % Weightage |
|--------|---|-----|-------------|
| 1      | <b>Chapter:1 Carbohydrates:</b> <ul style="list-style-type: none"> <li>• Definition, Classification, Functions of Carbohydrates.</li> <li>• Digestion, absorption of Carbohydrates.</li> <li>• Regulation of blood glucose &amp; its importance,</li> <li>• Hyperglycemia, Hypoglycemia</li> <li>• Diabetes &amp; Diabetic Profile.</li> <li>• Blood Glucose estimation &amp; Glucose Tolerance Test</li> <li>• Glucocylated Hb.</li> </ul>   | 15  | 25%         |
| 2      | <b>Chapter:2 Proteins:</b> <ul style="list-style-type: none"> <li>• Definition, Classification, Functions of Plasma Proteins</li> <li>• Plasma Proteins estimations.</li> <li>• Clinical significance plasma protein; Bence-Jones' Proteins and Cryoglobulins.</li> </ul> <b>Chapter:3 Lipids:</b> <ul style="list-style-type: none"> <li>• Lipid: Definition, Classification, Functions, Essential Fatty Acids</li> <li>• Lipoproteins: Classification and its Separation methods</li> <li>• Important Lipid Profile Tests- cholesterol, triglyceride, Lipoproteins, phospholipids and its significance in various disorders.</li> </ul> | 15  | 25%         |
| 3      | <b>Chapter:4 Clinical Enzymology:</b> <ul style="list-style-type: none"> <li>• Definition, Classification, Factors affecting enzyme activity, Isoenzymes and Coenzymes.</li> <li>• Clinical Enzymology: Therapeutic, diagnostic and analytical uses of enzymes</li> <li>• Estimation Methods and Diagnostic Importance of Enzymes &amp; Isoenzymes: Phosphatases, Transaminases,</li> </ul>   | 15  | 25%         |

|   |  |    |     |
|---|--|----|-----|
|   | <p>Lactate Dehydrogenases, Creatine Kinase, Amylase, Lipase, Gama Glutamyl Transferase</p> <p><b>Function tests:</b></p> <ul style="list-style-type: none"> <li>• Liver Function Tests</li> <li>• Renal Function Tests</li> <li>• Cardiac Function Tests</li> </ul>  |    |     |
| 4 | <p><b>Chapter:5 Minerals and electrolytes:</b></p> <ul style="list-style-type: none"> <li>• Minerals and Electrolytes determination and clinical Significance: Sodium, Potassium, Chloride, Calcium, Phosphorus, Iron &amp; TIBC</li> </ul> <p><b>Vitamins:</b></p> <ul style="list-style-type: none"> <li>• Brief Classification and Clinical Significance</li> </ul> <p><b>Hormones:</b></p> <ul style="list-style-type: none"> <li>• Types and biochemical functions.</li> <li>• Determination of T3, T4, TSH.</li> </ul> | 15 | 25% |

**Suggested Specification table with Marks (Theory):60**

| Distribution of Theory Marks<br>(Revised Bloom's Taxonomy) |                 |                   |                 |             |              |            |
|--|-----------------|-------------------|-----------------|-------------|--------------|------------|
| Level  | Remembrance (R) | Understanding (U) | Application (A) | Analyze (N) | Evaluate (E) | Create (C) |
| Weightage  | 20%             | 40%               | 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   | Learn about diabetes and its analysis in this course as it evaluates the overall structure and classification of carbohydrates. |
| CO2   | Cover plasma protein and lipid analyses, as well as fundamental structure and occurrence.                                       |
| CO3   | Refer clinical enzymology and measurement of enzyme activity for the diagnosis and treatment of diseases.                       |
| CO4   | Examine the importance of minerals and electrolytes, as well as the role of hormones and vitamins in the body.                  |

**List of practical:**

| Sr no. | Description  | Unit no. | Hrs       |
|--------|--|----------|-----------|
| 1      | Separation of Amino Acids using Thin Layer Chromatography.                                     | 2        | 4         |
| 2      | Estimation of Vitamin C by Iodometric Titration.   | 4        | 2         |
| 3      | Preparation of Lineweaver Burk Plot for Amylase Enzyme.  | 3        | 2         |
| 4      | Qualitative Analysis of Carbohydrates.   | 1        | 2         |
| 5      | Determination of pH, Turbidity and TDS of water sample   | 2        | 2         |
| 6      | Determination of D.O. and Conductivity of water sample.  | 3        | 3         |
| 7      | Preparation of p-Nitro Chloro benzene from Acetanilide.  | 2        | 2         |
| 8      | Preparation of Eosin from Phthalic Acid.   | 2        | 2         |
| 9      | Determination of Zn <sup>2+</sup> / Cu <sup>2+</sup> by Complexometric titration.              | 2        | 4         |
| 10     | Gravimetric estimation of Ni as Ni (Dimethyl Glyoxime) <sub>2</sub> /Ba as BaSO <sub>4</sub> . | 3        | 4         |
| 11     | Determination of COD of water sample   | 3        | 3         |
|        | <b>TOTAL</b>   |          | <b>30</b> |



**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of 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 laboratory.

**Reference Books:**

- 1) Lehninger A.L -2012, Principles of Biochemistry, Freeman, W.H.& Com
- 2) Godkar P.B., (2005), Textbook of Medical Laboratory Technology Vol 1 & 2, Bhalani Publications.
- 3) Conn E.E and Stumps P.K(1972), Outlines of biochemistry, 3rd edition, John Wiley & Sons
- 4) Amitava Dasgupta; Amer Wahed (2014) Clinical Chemistry, Immunology and Laboratory Quality Control. Himmelfarb Health Sciences. ISBN: 9780124078215
- 5) Kanungo R, (2017), Ananthanarayan and Paniker's Textbook of Microbiology, 10th Ed.

