PEOPLE'S COLLEGE OF MEDICAL SCIENCES & RESEARCH CENTRE, BHANPUR, BHOPAL
UNDERGRADUATE COURSE
MBBS: BIOCHEMISTRY

Program outcomes	At the end of the course the student shall be able to: 1. Demonstrate mastery of a broad set of biochemical knowledge concerning the fundamentals in the basic areas of the discipline (analytical, physical, genetic and metabolic biochemistry). 2. Solve area specific problems by identifying the essential parts of a problem, formulating a strategy for solving the problem, applying appropriate techniques to arrive at a solution, test the correctness of the solution, and interpret their results. 3. Use modern library search tools to locate and retrieve scientific information about a topic, chemical, chemical technique, or an issue relating to chemistry, going beyond textbooks, common handbooks and general online resources such as Wikipedia. 4. Know and follow the proper procedures and regulations for safe handling and use of chemicals. 5. Understand the objective of their chemical experiments, properly carry out the experiments, and appropriately record and analyze the results. 6. Use computers in data acquisition and processing and use available software as a tool in data analysis. 7. Use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments.

	8. Communicate the concepts and results of their laboratory experiments through effective writing and/or oral communication using the discipline standards for reporting and citation. 9. Collaborate effectively as part of a team to solve problems, debate different points of view and interact productively with a diverse group of team members.
Program specific outcomes	1. Knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis 2. Knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease 3. The student will have an understanding of the basic elements of intercellular signal transduction pathways, including nuclear receptors and cell surface receptors.
Course outcomes	At the end of the course the student, after undergoing the training, should be able to: 1. Explain the concepts related to work in clinical (medical) laboratory biochemical 2. Define the metabolic role of certain tissues and metabolites in physiological and / or pathological processes 3. Explain the metabolism of carbohydrates, proteins, lipids and lipoproteins 4. Correlate metabolic processes and methods for monitoring metabolites concentration 5. Apply standard experimental methods used in clinical (medical) laboratory biochemical.

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PEOPLE'S COLLEGE OF MEDICAL SCIENCES & RESEARCH CENTRE, BHANPUR, BHOPAL
POSTGRADUATE COURSE - MD/MSc : BIOCHEMISTRY

Program outcomes	At the end of the MD training programme in Biochemistry, the post graduate student should have acquired competencies in the following areas, as detailed below. 1. **Acquisition of knowledge** - The student should be able to explain clearly concepts and principles of biochemistry and cell biology, including correlations of these with cellular and molecular processes involved in health and disease. 2. **Teaching and training** - The student should be able to effectively teach undergraduate students in medicine and allied health science courses so they become competent health care professionals and able to contribute to training of postgraduate post graduate students. 3. **Diagnostic services** - The student should be able to set up/supervise/manage a diagnostic laboratory in Biochemistry in a hospital, ensuring quality control, and providing a reliable support service. The student should be able to provide clinicians with consultation services for diagnostic tests in biochemistry and in interpretation of laboratory results. 4. **Research** - The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

Program specific outcomes	4. Knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis 5. Knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease 6. The student will have an understanding of the basic elements of intercellular signal transduction pathways, including nuclear receptors and cell surface receptors.
Course outcomes	By the end of the course, the post graduate student should have acquired practical skills in the following: **1.** Performance of reactions of carbohydrates, amino acids and proteins, and lipids **2.** Experiments to demonstrate constituents of milk **3.** Experiments to demonstrate normal and abnormal constituents of urine **4.** Determination of iodine number and saponification number of fats **5.** Estimation of ammonia and amino acids by Sorenson formal titration **6.** Estimation of nitrogen estimation in a given amino acid solution by micro Kjeldahl method **7.** Estimation of phosphorus by Fiske Subbarao method **8.** Estimation of ascorbic acid in lime **9.** Estimation of calcium content in milk **10.** Estimation of proteins by Folin's method and dye binding method. **11.** Two-dimensional paper chromatography for separation of amino acids

	12. Preparation and estimation of starch, glycogen, cholesterol, casein (phosphorus in casein) and hemoglobin from biological samples Determination of enzyme activity and study of enzyme kinetics, using any 2 suitable enzymes (eg, catalase from rat liver and acid phosphatase from potatoes). • Estimation of clinical analytes as detailed below: performance of glucose tolerance test electrolytes, arterial blood gas analysis • blood glucose, glycated haemoglobin; • cholesterol, triglycerides, free fatty acids, phospholipids, Lp (a), urea, creatinine, uric acid, ammonia, microalbuminuria • parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time) • Calcium, magnesium, copper (and ceruloplasmin), serum iron, TIBC and ferritin • markers of myocardial damage (CK, CK MB, troponins, LDH) • other enzymes of diagnostic relevance (eg. phosphatases, amylase etc) • vitamins D and B12and folate • Electrophoresis of serum proteins • Electrophoresis of lipoprotein (Optional) • Electrophoretic separation of LDH isozymes or any other isoenzymes • Clearance tests • CSF analysis • Thyroid function tests and other hormone assays by ELISA/RIA • Preparation of buffers. **Clinical Laboratory**

	• Taking any one parameter, students should prepare a Levy Jennings chart and plot inter-assay and intra-assay variation for the laboratory. • Implementation of Westgard rules. Optional: • Determination of reference values for any one parameter for the clinical laboratory In addition, all efforts should be made to ensure that students at least see a demonstration of the following techniques. • Separation of peripheral blood lymphocytes using Ficoll Hypaque • Subcellular fractionation/marker enzymes for organelles to demonstrate fractionation • Ultracentrifugation • Isolation of high molecular weight DNA from tissues/blood • Isolation of RNA; synthesis of cDNA by reverse transcription; PCR (both conventional and real-time) • Isolation of plasmids and agarose gel electrophoresis for proteins and nucleic acids • Basic techniques in cell culture • High performance liquid chromatography (HPLC)

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