

142 MBC (Medical Biochemistry –2)

Course name	Medical Biochemistry -2
Course code &No.	MBC 142 (A & B)
Credit hours	4 hours
Duration	One academic year
Study year	Second year of Medical college

Lectures: once /week = 1h **Tutorials:** once/week = 3 h **Practical:** once/week = 3 h

The course is conducted to two male student groups (A&B) and one female student group

Objectives:

1. To provide an explanation of the relationship between the nature and biological activities of nucleic acids with emphasis on the immense impact that such information had on the medical field.
2. To enable understanding of the biochemical defects underlying common pathological conditions requiring routine or emergency laboratory diagnosis and evaluation.
3. To enable understanding of the principles of human nutrition and knowing the types and amounts of macronutrients that are needed to maintain optimal health.
4. To give students information about the structure and function and the clinical importance of fat-soluble vitamins in health and disease.
5. To provide students with knowledge about the chemical constituents of biological fluids with special emphasis on blood, their function and alterations in different diseases.

Course Outline:

(A) **Theoretical**

No. of Lectures = 30

NITROGEN METABOLISM :

Nucleotide metabolism

(3 lectures)

- Nucleotide structure
- Synthesis of purine nucleotides
- Synthesis of deoxyribonucleotides
- Degradation of purine nucleotides
- Pyrimidine synthesis and degradation

STORAGE AND EXPRESSION OF GENETIC INFORMATION:

DNA structure and replication

(4 lectures)

- Structure of DNA
- Steps in prokaryotic DNA synthesis
- Eukaryotic DNA replication
- Organization of eukaryotic DNA
- DNA repair

RNA structure and synthesis

(3 lectures)

- Structure of RNA
- Ribosomal RNA
- Transfer RNA
- Messenger RNA
- Transcription of prokaryotic genes
- Transcription of eukaryotic genes
- Posttranscriptional modification of RNA

Protein synthesis

(3 lectures)

- The genetic code
- Components required for translation
- Codon recognition by tRNA
- Steps in protein synthesis
- Posttranslational modification of polypeptide chains

Biotechnology and human disease

(3 lectures)

- Restriction endonucleases
- DNA cloning
- Probes
- Southern blotting
- Restriction fragment length polymorphism
- Polymerase chain reaction (PCR)
- Analysis of gene expression
- Gene therapy
- Transgenic animals

NUTRITION AND VITAMINS:

Nutrition

(3 lectures)

- Dietary reference intakes
- Energy requirement in humans
- Acceptable macronutrient distribution ranges
- Dietary fats
- Dietary carbohydrates
- Dietary protein
- Diet and cancer

Vitamins

(2 lectures)

- Vitamin A
- Vitamin D
- Vitamin K
- Vitamin E
- Vitamin supplements

Obesity

(2 lectures)

- Assessment of obesity
- Body weight regulations
- Metabolic changes observed in obesity
- Obesity and health
- Weight reduction

BLOOD AND BODY FLUIDS:

Blood

(2 Lectures)

- Functions of the blood
- Preparation of plasma and serum
- The Red Blood Cells
- Enzyme related hemolytic anemia

Globular Proteins

(3 lectures)

- Globular hemeproteins
- Structure of heme
- Structure and function of hemoglobin & myoglobin
- Minor hemoglobins [Fetal Hb (Hb F) & Hb A1c]

Plasma Proteins

(2 lectures)

Body Fluids

(1 lecture)

- Urine - CSF

(B) Tutorials:

- **Nucleotides metabolism :**
 - Hyperuricemia vs gout
- **DNA structure :**
 - Rest. Endonucleases
- **Replication :**
 - Topoisomerases & Mol. Mechanism of drug action
 - Telomerase & Repair mechanisms
- **Transcription:**
 - Lac operon & Posttranscriptional modifications
- **Translation:**
 - Mechanism of action of antibiotics & posttranslation modifications
- **Free Radicals & Oxidative stress:**
 - Nutritional requirements
- **Vitamins:**
 - Fat-soluble vitamins & clin. correlations
- **Obesity**
- **Hb. & myoglobin structure**
- **Hb. - clinical correlations**

(C) Practical

1. Estimation of serum uric acid.
2. Kidney function tests, Creatinine clearance.
3. Nucleic acids.
4. PCR.
5. Iron determination.
6. Hb. electrophoresis.
7. Plasma proteins.
8. Physical properties and abnormal constituents of urine.

DISTRIBUTION OF MARKS IN THE ANNUAL SYSTEM

First Half of the Year	
Activity	Marks
Practical & tutorial	10
First Assessment Test (Mid-term)	10
Tutorial (quizzes)(2)	5
End of the Term Exam (Mid-year)	10
Subtotal	35 Marks

Second Half of the Year	
Activity	Marks
Practical & tutorial	10
Second Assessment Test (Mid-term)	10
Tutorial (quizzes)(2)	5
Subtotal	25 Marks

FINAL Examination:(MCQ)	30 Marks
Oral Examination	10 Marks
Subtotal	40 Marks
TOTAL	100 Marks

Assigned Textbook :

1. Lippincott Reviews of Biochemistry, 3rd edition by Champe PC, Harvey RA, Ferrier DR, Lippincott William & Wilkins London, 2005

Additional text books:

2. Harper's Illustrated Biochemistry: 27th Edition by Murray RK, Granner DK, Mayes PA, Rodwell VW, McGraw-Hill companies New York, 2005
3. Text book of Biochemistry with Clinical Correlations 5th Edition, Devlin TM Ed, Wiley –Liss New York 2002

Internet sites:

Medical Biochemistry Resources