

Curriculum
on
Bachelor in Pharmacy
(B. Pharm)



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The first year consists of six-theory papers and three practical carrying a total load of 990 Teaching Hours (46) including both theory and practical. In the second year, there are six theory papers and six-practical carrying a total load of 1080 Teaching Hours (48). In the third year, there are seven theory papers and three practical carrying a total load of 900 Teaching Hours (48) and in the fourth year there will be four theory and one practical paper carrying a total load of 450 Teaching Hours (36). The course consists of total of 3420 Teaching Hours (178). Apart from these papers, a 3 months' period is allotted to Dissertation and a 2 months time is allotted to the in-plant training in the fourth year.

10. Curriculum structure of Bachelor of Pharmacy

Code No.	Name of the subject	Hrs/ wk	Hrs/ yr	Credit	Marks
FIRST YEAR					
BP 401 A	Anatomy, Physiology & Pathology-Theory	3	90	6	100
BP 402 A	Biochemistry- Theory	3	90	6	100
BP 402 B	Biochemistry-Practical	3	90	2	50
BP 403 A	Pharmaceutical Chemistry-Theory	3	90	6	100
BP 403 B	Pharmaceutical Chemistry-Practical	3	90	2	50
BP 404 A	Medicinal Chemistry I-Theory	3	90	6	100
BP 405 A	Pharmacology I-Theory	3	90	6	100
BP 406 A	Pharmaceutical Microbiology-Theory	3	90	6	100
BP 406 B	Pharmaceutical Microbiology-Practical	3	90	2	50
	Total of First Year	33	990	46	750
SECOND YEAR					
BP 501 A	Pharmaceutics I (Physical Pharmacy)-Theory	3	90	6	100
BP 501 B	Pharmaceutics I (Physical Pharmacy)- Practical	3	90	2	50
BP 502 A	Medicinal Chemistry II-Theory	3	90	6	100
BP 502 B	Medicinal Chemistry II-Practical	3	90	2	50
BP 503 A	Biopharmaceutics and Pharmacokinetics- Theory	3	90	6	100
BP 503 B	Biopharmaceutics and Pharmacokinetics- Practical	3	90	2	50
BP 504 A	Pharmacognosy -Theory	3	90	6	100
BP 504 B	Pharmacognosy –Practical	3	90	2	50
BP 505 A	Pharmacology II-Theory	3	90	6	100
BP 505 B	Pharmacology II-Practical	3	90	2	50

BP 506 A	Pharmaceutical analysis and quality assurance I-Theory	3	90	6	100
BP 506 B	Pharmaceutical analysis and quality assurance I- Practical	3	90	2	50
	Total of Second Year	36	1080	48	900
THIRD YEAR					
BP 601 A	Pharmaceutical Engineering-Theory	3	90	6	100
BP 602 A	Pharmaceutics II (Dosage Forms and Formulation) -Theory	3	90	6	100
BP 602 B	Pharmaceutics II (Dosage Forms and Formulation)-Practical	3	90	2	50
BP 603 A	Pharmaceutical analysis and quality assurance II- Theory	3	90	6	100
BP 603 B	Pharmaceutical analysis and quality assurance II- Practical	3	90	2	50
BP 604 A	Ayurvedic and Herbal Technology-Theory	3	90	6	100
BP 604 B	Ayurvedic and Herbal Technology-Practical	3	90	2	50
BP 605 A	Biostatistics & Research Methodology-Theory	3	90	6	100
BP 606 A	Pharmaceutical Jurisprudence-Theory	3	90	6	100
BP 607 A	Community Pharmacy and First Aid-Theory	3	90	6	100
	Total of Third Year	30	900	48	850
FOURTH YEAR					
BP 701 A	Clinical and Hospital Pharmacy-Theory	3	90	6	100
BP 701 B	Clinical and Hospital Pharmacy-Practical	3	90	2	50
BP 702 A	Pharmaceutical Management-Theory	3	90	6	100
BP 703 A	Pharmaceutics III (Industrial Pharmacy) – Theory	3	90	6	100
BP 704 A	Pharmacotherapeutics-Theory	3	90	6	100
BP 705 DT	Dissertation			6	100
BP 706 IP	In-plant Training in Hospital +Industry (4 weeks each)			4	100
	Total of Fourth Year	15	450	36	650
	Grand Total	114	3420	178	3150

For the dissertation work, each student should develop a thesis topic, which will be carried out under the guidance of teachers. The students should submit a thesis and defend it.

Recognizing the need to develop the ability to translate theory into practice, students are placed for in-plant training in pharmaceutical manufacturing units, hospitals, drug stores as a part of curriculum at the beginning of 4th year.

BIOCHEMISTRY

Subject: Theory	Year: First	Code: BP 402 A
Full Marks: 100	Total Teaching hours: 90	Credit hour: 6

Course Description: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is to provide biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It also emphasizes on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

General objectives:

At the end of this course, student will be able to

- a Describe the biomolecules and their biological importance the
- b Describe the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- c Describe intertry metabolism of the above biomolecules and regulation of individual metabolism.
- d Describe the metabolism of biomolecules in physiological and pathological conditions.
- e Describe the biochemical basis of normal and diseased conditions of different organ systems
- f Describe the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
- g Develop skills of performing biochemical techniques like colorimetry, spectrophotometry, centrifugation, and interpreting the data.
- h Perform and interpret the result of the analysis of biological fluids and correlating the same in health and disease.

Specific objectives:

Unit 1: Introduction of Biochemistry [2Hrs]

After the completion of the course, students will be able to

- a Define terminologis used in biochemistry.
- b Discuss scope and importance of biochemistry
- c Discuss cell-structure & function of cell membrane and subcellular organelles

Unit 2: Biomolecules [11Hrs]

After the completion of the course, students will be able to

- a Discuss definition, classification and biological importance of carbohydrates,
- b Discuss definition, classification and biological importance of Proteins
- c Discuss definition, classification and biological importance of lipids
- d Discuss types and functions of Lipoproteins.
- e Discuss functions of DNA & RNA

Unit 3: Enzymes and Bioenergetics [6 Hrs]

After the completion of the course, students will be able to

- a Discuss definition and Classification of enzymes with examples.
- b Discuss factors affecting enzyme activity.
- c Discuss definition and clinical significance of Isoenzymes and Co-enzymes
- d Discuss enzyme inhibition & regulation of enzyme activity.
- e Describe biochemical roles of enzymes in disease processes
- f Describe regulation of Electron Transport Chain and Oxidative Phosphorylation

Unit 4: Intery Metabolism of Biomolecules and [18 Hrs]

a Carbohydrate metabolism

After the completion of the course, students will be able to

- Discuss digestion and absorption of carbohydrates, proteins and lipid.
- Regulation and Clinical Significance of Glycolysis
- Regulation and Clinical Significance of Glycogenesis and Glycogenolysis
- Regulation and Clinical Significance of Gluconeogenesis
- Regulation and Clinical Significance of HMP Shunt
- Regulation and Clinical Significance of Citric Acid Cycle
- Discuss hormonal regulation of blood glucose level and Diabetes mellitus

b Lipid metabolism

After the completion of the course, students will be able to

- Discuss oxidation of saturated and unsaturated fatty acids (alpha, beta and Omega)
- Discuss formation and utilization of ketone bodies; ketoacidosis.
- Discuss De-novo synthesis of fatty acids (Palmitic acid).
- Discuss biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D.
- Discuss disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity

c Amino acid and protein metabolism

After the completion of the course, students will be able to

- Discuss: transamination, deamination & decarboxylation.
- Discuss regulation and clinical significance urea cycle.
- Discuss catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)
- Discuss significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

d Nuceotide Metabolism: Purine and Pyrimidines

After the completion of the course, students will be able to

- Explain De-novo and Salvage pathway.
- Discuss Genetic Disorders related to the Salvage Pathways

e. Xenobiotics

After the completion of the course, students will be able to
Discuss different mechanisms of Xenobiotic Metabolism (Hydroxylation, Conjugation, Methylation, Acetylation)

f. Liver and Bilirubin Metabolism

After the completion of the course, students will be able to

- Discuss function of Liver and Gall Bladder.
- Discuss Bilirubin Metabolism and Jaundice.
- Explain biochemical basis of different types of jaundice and their differential diagnosis.

Unit 5: Endocrine Chemistry [11 Hrs]

After the completion of the course, students will be able to

- a. Discuss classification, functions and biochemical importance of hormones of different glands. (Pituitary, Anterior, posterior, Thyroid, Adrenal cortex, Adrenal medulla)
- b. Discuss brief description of hypothalamic hormones and hormonal Regulation

Unit 6: Acid Base Balance [3 Hrs]

After the completion of the course, students will be able to

- a. Discuss buffer systems of the body and expression of concentration of a solution in different ways,
- b. Discuss acid Base Homeostasis

Unit 7: Renal and Electrolyte system [8 Hrs]

After the completion of the course, students will be able to

- a. Discuss evaluation of renal function using laboratory tests.
- b. Discuss Water and sodium distribution in the body.
- c. Explain interrelationship between water, sodium and extracellular fluid and osmolality.
- d. Discuss causes of water and sodium depletion.
- e. Discuss causes of hyponatraemia and hypernatraemia and their biochemical implications.
- f. Discuss causes of hyperkalaemia and hypokalaemia and their biochemical implications.

Unit 8: Nutrition and Biochemistry [4 Hrs]

After the completion of the course, students will be able to

- a. Define Malabsorption, Starvation and Obesity
- b. Discuss Biochemical Significance of above terminologies

Unit 9: Tumor Markers [4 Hrs]

After the completion of the course, students will be able to

Discuss introduction, classification, biochemical and clinical Significance of tumor markers

Unit 10: Organ function test [4 Hrs]

After the completion of the course, students will be able to
Discuss Liver, Cardiac, Renal and thyroid function test and their Clinical Significance

Unit 11: Molecular Biology and Genetics [16 Hrs]

After the completion of the course, students will be able to

- a. Discuss Cell Cycle and Importance
- b. Discuss Genetic information pathway
- c. Define Chromosome, Gene, Genetic code, DNA, RNA.
- d. Explain DNA Replication, Transcription (RNA synthesis) and Translation (Protein synthesis) and
- e. Discuss action of drugs on DNA and RNA metabolism
- f. Discuss defects in DNA replication.
- g. Discuss mutations
- h. Explain DNA Repair Mechanisms
- i. Discuss Hybridization and Blotting Techniques
- j. Discuss RDT and Gene Therapy
- k. Discuss Vectors, PCR and Clinical Importance.

BIOCHEMISTRY

Subject: Practical	Year: First	Code: BP 402 B
Full Marks: 50	Total Teaching hours: 90	Credit hour: 2

At the end of the course, students will be able to

1. Perform qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Test for identification of Proteins (albumin and Casein)
3. Perform quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Perform qualitative analysis of urine for abnormal constituents
5. Demonstrate working of pH meter, Colorimeter and spectrophotometer
6. Estimate the glucose in serum
7. Estimate the glucose in urea
8. Estimate the glucose in protein
9. Estimate the glucose in albumin
10. Estimate the glucose in Cholesterol
11. Estimate the glucose in triglyceride
12. Estimate the uric acid in serum
13. Estimate the calcium in serum
14. Estimate the amylase in serum
15. Estimate SGOT in serum,
16. Estimate bilirubin in serum

17. Estimate alkaline phosphate in serum.
18. Perform sugar test in urine
19. Perform the albumin test in urine
20. Prepare standard buffer solutions (acetate, borate, carbonate, citrate and phosphate) and measurement of pH.
21. Perform separation of serum proteins by electrophoresis on cellulose acetate.

Reference books (Latest Editions)

1. Jayaraman J. Laboratory Manual in Biochemistry. Wiley Eastern Limited.
2. Singh S.P. Practical Manual to Biochemistry. CBS Publisher, New Delhi.
3. Nelson D. L, Cox M. M. Lehninger Principles of Biochemistry. Macmillan Worth Publishers.
4. Stryer L. Biochemistry. WH, Freeman & Company, San Francisco.
5. Murry R. K, Granner D. K, Rodwell W. Harper's Biochemistry. Lange Medical Publication
6. Satyanarayan U, ChakrapaniU. Essentials of Biochemistry. Book and Allied Pvt. Ltd.
7. Gupta R. C, Bhargavan S. Practical Biochemistry.