



**Dr. Rafiq Zakaria Campus**

Maulana Azad Educational Trust's

**Y. B. CHAVAN COLLEGE OF PHARMACY**

(B. Pharm, M. Pharm & Research Centre)

ISO 21001:2018 & ISO 14001:2015 CERTIFIED | NIRF-2022 ALL INDIA RANK 65<sup>TH</sup>

**NAAC ACCREDITATION "A" GRADE WITH 3.23 CGPA SCORE**

# COURSE MODULE

<b>Program Title</b>	B. Pharmacy
<b>Department</b>	Pharmaceutical Chemistry
<b>Course Title</b>	Biochemistry

**1. NAME OF INSTITUTION** : Y. B. CHAVAN COLLEGE OF PHARMACY,  
AURANGABAD

**2. AFFILIATED UNIVERSITY** : DR. BABASAHEB AMBEDKAR

3. **DEPARTMENT** : PHARMACEUTICAL CHEMISTRY  
4. **PROGRAM TITLE** : B. PHARM.

**4.1. Program Outcomes (PO):**

**PO 01: Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**PO 02: Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**PO 03: Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**PO 04: Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**PO 05: Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**PO 06: Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**PO 07: Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal

variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**PO 08: Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**PO 09: The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**PO 10: Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 11: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

## 5. COURSE SPECIFICATION :

### 5.1.Course Identification and General Information

a. Course Title:	<b>Biochemistry</b>	
b. Course Number/Code	<b>BP 203 T</b>	
c. Credit Hours	Theory	Practical
	45(3 Hrs/Week	60 (4Hrs. / Week)
d. Study level/semester at which this course is offered	Second Semester B. Pharm.	
e. Pre-requisite	<b>203 T(Biochemistry)</b>	
f. Co-requisite		
g. Program in which the course is offered	B Pharm	
h. Language of teaching the course	English	
i. Prepared by	Mr. Mohammed Imran Anees	
j. Approved by HOD	Dr. K G Baheti	

**5.2.Course Description:** Biochemistry is a Science which deals with Biological and Chemical reaction occurring within cellular system specially plant cell, animal cell and Human cell. It is a science which revolves around cellular changes in humans, plant and animal cell.

### 5.3. Course Objectives:

- To establish relationship between Biology and Chemical Reaction occurring within body.
- To understand importance of plant cell, animal cell and Human cell.
- To develop the concepts of applying knowledge of Metabolism occurring in human body such as Carbohydrate metabolism, Protein metabolism, Lipid metabolism.
- To train students about different techniques of Isolation of Enzymes, Estimation of Carbohydrates, Proteins, Enzymes.
- To train students on use of methods used to isolate DNA, RNA and Protein.

- To introduce students about importance of Biochemistry of human body as maximum research is ongoing on cellular organelles.

## 6.0. Course Outcomes (COs) : (Min. 4 and Max. 6)

(Use Bloom's Taxonomy words)

CO Code	Course outcome
CO 203T.01	Describe processes taking place at molecular level inside living cells
CO 203T.02	Summarize the metabolic pathway of biomolecules
CO 203T.03	Classify biomolecules and write their structure
CO 203T.04	Explain enzymes and their role in metabolism

## 6.1. Knowledge and Understanding

(Alignment of POs to COs)

CO Code	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 203T.01	3	2	2	1	--	1	1	--	1	1	1
CO 203T.02	3	2	2	1	1	2	1	1	3	2	2
CO 203T.03	3	2	2	1	---	2	2	1	3	2	2
CO 203T.04	3	2	2	2	--	3	2	--	3	2	1

Correlation levels 1, 2 or 3 as defined below:

2: Moderate (Medium); 3: Substantial (High); If there is no correlation,

1: Slight (Low); put '-'

## 6.2. Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
<b>Lectures (Constructivist learning)</b> <b>Collaborative learning (Discussion)</b> <b>Project based Learning</b> <b>Blended learning</b> <b>Inquiry based learning</b> <b>Flash cards</b> <b>Video</b> <b>Equipment models</b>	<b>Formative Assessment</b> <b>Case study</b> <b>Class test</b> <b>Multiple choice questions</b> <b>Assignments</b> <b>Seminar</b> <b>Viva Voce</b> <b>Synopsis</b> <b>Tutorials</b> <b>Summative Assessment</b>

## 6.3. Tools for the Teaching and learning

Theory subjects	Practical Subjects
<ul style="list-style-type: none"> <li>• <b>PowerPoints presentation</b></li> <li>• <b>Videos</b></li> <li>• <b>Flash Card</b></li> <li>• <b>Models</b></li> <li>• <b>Software</b></li> <li>• <b>Charts</b></li> <li>• <b>Smart Boards</b></li> <li>• <b>White boards</b></li> <li>• <b>Online Platform</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>White boards</b></li> <li>• <b>Glassware</b></li> <li>• <b>Chemicals</b></li> <li>• <b>Instruments</b></li> <li>• <b>Equipment</b></li> <li>• <b>Software</b></li> <li>• <b>Models</b></li> <li>• <b>Plants/Crude Drugs</b></li> <li>• <b>Animal</b></li> </ul>

## 6.4. COURSE CONTENT

### Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	<b>Unit I</b>	<p>Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus</p> <ul style="list-style-type: none"> <li>• Biological oxidation Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation &amp; its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers</li> </ul>	<b>3 and Half week</b>	<b>10</b>
2	<b>Unit II</b>	<p><math>\beta</math>-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.</p> <p>Amino acid metabolism General reactions of amino acid metabolism: Transamination, deamination &amp; decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alpeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice</p>	<b>3 and Half week</b>	<b>10</b>

3	<b>Unit III</b>	<ul style="list-style-type: none"> <li>Nucleic acid metabolism and genetic information transfer Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors</li> </ul>	<b>3 and Half week</b>	<b>10</b>
4	<b>Unit IV</b>	<p>Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.</p> <p>Bioenergetics Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP</p>	<b>2 and half week</b>	<b>8</b>
5	<b>Unit V</b>	<p>Enzymes Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples</p> <p>Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes – Structure and biochemical functions</p>	<b>2 and half week</b>	<b>7</b>
	<b>TOTAL</b>			<b>45</b>

### 6.1. Practical Aspects

Order	Name of Experiment	Number of Weeks
<b>1</b>	Introduction to Biochemistry	<b>One week</b>



	Safety Measures and Terms used in Biochemistry Practical's	
2	Flow Chart used for Qualitative Test of Carbohydrates	<b>One week</b>
3	Qualitative Test of Carbohydrates: Glucose	<b>One week</b>
4	Qualitative Test of Carbohydrates: Fructose	<b>One week</b>
5	Qualitative Test of Carbohydrates: Maltose	<b>One week</b>
6	Qualitative Test of Carbohydrates: Lactose	<b>One week</b>
7	Qualitative Test of Carbohydrates: Starch	<b>One week</b>
8	Flow Chart used for Qualitative Test of Proteins	<b>One week</b>
9	Qualitative Test of Proteins: Albumin	<b>One week</b>
10	Qualitative Test of Proteins: Globulin	<b>One week</b>
11	Qualitative Test of Proteins: peptone	<b>One week</b>
12	Qualitative Test of Proteins: Gelatin	<b>One week</b>
13	Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)	<b>One week</b>
14	Estimation of Salivary Amylase	<b>One week</b>
15	Isolation of Bacterial Amylase Enzyme	<b>One week</b>
16	Effect of pH on Enzyme activity	<b>One week</b>
17	Effect of Temperature on Enzyme	<b>One week</b>



## 10.0. LEARNING RESOURCES:

Sr. No.	Title of Learning Material	Details
1	Text books	<ol style="list-style-type: none"><li>1) Deb A.C., Fundamentals of Biochemistry, New Central Book Agency Kolkata 1996.</li><li>2) David L. Nelson, Lehninger's Principles of Biochemistry, W.H. Freeman And Company</li></ol>
2	Essential references (as per syllabus)	<ol style="list-style-type: none"><li>1) Pattab Iraman, Principles of Biochemistry, Gajanan Bangalore</li><li>2) Champe P., Lippincot's Illustrated Reviews Biochemistry, William and Wilkins</li><li>3) Deb A.C., Fundamentals of Biochemistry, New Central Book Agency Kolkata 1996.</li><li>4) David L. Nelson, Lehninger's Principles of Biochemistry, W.H. Freeman And Company</li></ol>
3	Reference material	Hand Written Notes.
4	E-materials and websites	Soft copies (word/ Pdf files), PPT's.
5	Other learning material	Handouts

## 11.0. FACILITIES REQUIRED:

Sr. No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

## 12.0. COURSE IMPROVEMENT PROCESSES:

### 12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms and online questionnaires

### 12.2. Other strategies for evaluation of teaching by the instructor or by the department:

Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

### 12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

### 12.4. Describe the planning procedures for periodically reviewing of course effectiveness and planning for improvement:

Periodic review by departmental meeting , Review of course delivery and outcome through assessment and feedback from all stake holders.

### 12.5. Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

## 13.0. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

<b>Name</b>	1) Mr. Mohammed Imran Anees (B. Pharm II <sup>nd</sup> SEM A & B Div)
<b>Location</b>	Pharmaceutical-Chemistry Dept.
<b>Contact Detail (e-mail &amp; cell no.)</b>	<a href="mailto:imran.anees2020@gmail.com">imran.anees2020@gmail.com</a> 8087611801
<b>Office Hours</b>	10:00 AM to 5:00 PM

