

**School of Chemistry
Faculty of Science
University of the Punjab, Lahore
Course Outline**



BS Chemistry Semester-III					
Programme	BS Chemistry	Course Code	Chem-276	Credit Hours	2
Course Title	Introductory Biochemistry		Course Type	Major Elective	
Course Introduction					
<p>This course will provide the Fundamental concepts in biochemistry and understand the basic knowledge of Cell, organelles and their function. This course will also give the knowledge about the importance of water, buffer, electrolytes in cell structure and function. This can be helpful to understand the importance of nutrients to sustain the healthy life</p> <p>Scope and molecular basis of Biochemistry in life. Introduction of living cells; Prokaryotes and Eukaryotes. A brief description on the isolation, structure and functions of cellular organelles. Importance of water in living cells to sustain the life; Physical, Chemical properties of water and the importance of water to sustain the animal and plant, water homeostasis, hypertonic and hypotonic pressure, biomolecules. Water importance with respect to electrolytes, buffer and its importance in life; respiration, importance of pH in different. Introduction and importance the science of food, nutrition and nutrients in life Classification of nutrients and its importance. Energy value of biomolecules, Basal metabolic rate (BMR), respiratory quotient and their measurements. Energy expenditure and its importance for healthy life. Factors affecting metabolism and energy expenditure. Different methods to measure the energy expenditure; like Direct, Indirect calorimetry methods etc. Thermogenic effect of food in energy expenditure. Status of nutrition in different countries around Pakistan</p>					
Learning Outcomes					
<p>After studying this course, students will be able to understand the cells, organelles and life.</p> <ol style="list-style-type: none"> Students will also learn the importance of water, buffer and buffering system in both animal and plants Student will chance to learn about nutrition and nutrient to sustain healthy life and its status in Pakistan and developed countries in the world 					
Course Content				Assignments/Readings	
Week 1	Scope and molecular basis of Biochemistry in life.			Class base learning/test	
	Introduction of living cells; Prokaryotes and Eukaryotes.			Class base learning/test	
Week 2	A brief description on the isolation, structure and functions of cellular organelles.			Class base learning/test	
	A brief description structure and functions of cellular organelles.			Class base learning/test	
Week 3	Importance of water in living cells to sustain the life; A brief description about Physical and the effect of solute on the physical properties of water			Class base learning/test	
	Importance of water to sustain the animal and plant, water homeostasis, hypertonic and hypotonic pressure, biomolecules.			Class base learning/test	

Week 4	Weak acids, strong acids and Proton hopping in water, water as weak conductor of electricity,	Class base learning/test
	Class Discussion	-
Week 5	What is pH and buffer, and their importance in laboratory	Class base learning/test
	Importance of importance in life; respiration, importance of pH in different	Class base learning/test
Week 6	Role of water in photosynthesis	Class base learning/test
	Detail summary lecture on cells, and water and its importance along with buffer, pH and solute	-
Week 7	Discussion with class	-
	Quiz on previous (Give marks, if necessary, from assignment)	-
Week 8	Mid term	
Week 9	Assign topics on biochemistry importance in life and other sciences as assignments and discussion	Class base learning/test
Week 10	What is food and nutrients Introduction and importance the science of food, nutrition and nutrients in life	Class base learning/test
	Classification of nutrients and its importance	Class base learning/test
Week 11	Brief introduction and role of macronutrients for heathy life	Class base learning/test
	Brief introduction and role of vitamins as microminerals for heathy life	Class base learning/test
Week 12	Brief introduction and role of minerals as microminerals for heathy life	Class base learning/test
	Class Discussion	-
Week 13	Energy value of biomolecules, Basal metabolic rate (BMR), respiratory quotient and their measurements.	Class base learning/test
	Factors affection in Energy value of biomolecules, Basal metabolic rate (BMR), respiratory quotient and their measurements.	Class base learning/test
Week 14	Energy expenditure and its importance for healthy life. Factors affecting metabolism and energy expenditure.	Class base learning/test
	Different methods to measure the energy expenditure; like Direct, Indirect calorimetry methods etc.	Class base learning/test
Week 15	Thermogenic effect of food in energy expenditure	Class base learning/test
	Status of nutrition in different countries around Pakistan	Class base learning/test

Week 16	Discussion with Class	-
	Quiz on previous (Give marks, if necessary, from assignment)	-

Reading Material

1. Lehninger, A. L., Nelson, D. L., & Cox, M. M. (2017). *Principles of biochemistry* (7th ed.). W. H. Freeman and Company.
2. Stryer, L. (2019). *Biochemistry* (8th ed.). W. H. Freeman and Company.
3. Murray, R. K., Bender, D. A., Botham, K. M., Kennelly, P. J., & Rodwell, V. W. (2017). *Harper's biochemistry* (30th ed.). McGraw-Hill Education.
4. Eastwood, M. A. (2005). *Principles of human nutrition* (2nd ed.). Blackwell Publishing. ISBN: 9780632058112.
5. Mahmood, S. (2002). *Essentials of human nutrition*. Urdu Bazar Lahore Majeed Book Depot.
6. Mahan, L. K., & Escott-Stump, S. (2020). *Krause's food & the nutrition care process* (15th ed.). Elsevier.
7. Smolin, L. A., & Grosvenor, M. B. (2020). *Nutrition: Science and applications* (4th ed.). Wiley.
8. Mato, J. M., & Mato, J. M. (2020). *Nutrients: Mechanisms and pathways*. Wiley.

Teaching Learning Strategies

- Lecturing using white/black board/Multimedia
- Written Assignments/presentations/ Task related to assigned topics
- Class activities and discussion
- Quiz about last lecture

Assignments: Types and Number with Calendar

Assignment, Quiz, Task, Presentation etc.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

BS Chemistry Semester-III					
Programme	BS Chemistry	Course Code	Chem-277	Credit Hours	1
Course Title	Introductory Biochemistry-Lab		Course Type	Major Elective	
Course Introduction					
<p>To understand the Safety measures and laboratory ethics and use of basic instruments like pH meter, spectrophotometer and flame photometer. This course will be helpful practical for the formation of different solutions and dilution formation from stock solution.</p> <p>Safety measures in bio-laboratory and laboratory working ethics. Preservation of animal and plant sample for experiments. Preparation of solutions routinely used in biochemical experiments (e.g., percent, ppm, normal, molar solutions). pH determination using various methods. Calibration of pH meter for the determination of pH. Preparation of buffers-PBS, Citrate buffer etc. Use of spectrophotometer & Flame photometer. Calibration of micropipette and its use. Washing and use of glassware's for biological experiments. Determination of Na, Ka, Li, Ca by flame photometer</p>					
Learning Outcomes					
<ol style="list-style-type: none"> 1. Students will be able to get knowledge about the biosafety measures and ethics about the biolaboratory 2. Students will learn different basic practical like solution formation and use of pH meter 3. Students will also learn the buffer formation, use of basic glassware, handling of apparatus, and flame photometer. 					
Course Content				Assignments/Readings	
Week 1	Laboratory ethics to use chemical, biological sample, working in the biological laboratory and basic instruments			Read from listed books	
Week 2	Awareness about the preparation of the laboratory solution and pH determination			Class base learning/test	
Week 3	Solution preparation (percentage and ppm) and its conversion, and its importance in laboratory			Class base learning/test	
Week 4	Solution preparation (Molar and molal), dilutions from stock solution and its conversion, and its importance in laboratory			Class base learning/test	
Week 5	Practice of solution formation			Class base learning/test	
Week 6	Preservation of animal samples			Class base learning/test	
Week 7	Discussion on			-	
Week 8	Midterm Exams			-	
Week 9	Measurement of pH of different sample by using different methods and their comparison			Class base learning/test	
Week 10	Preparation of buffers-PBS, Citrate buffer etc			Class base learning/test	
Week 11	Use of spectrophotometer & Flame photometer			Class base learning/test	
Week 12	Assign the assignments to students and discussion			Class base learning/test	

Week 13	Calibration of micropipette and its use	Class base learning/test
Week 14	Washing and use of glassware's for biological experiments	Class base learning/test
Week 15	Determination of Na, Ka, Li, Ca by flame photometer	Class base learning/test
Week 16	Final Term	-

Reading Material

1. Varley, H., Gowenlock, A. H., & Bell, P. G. (2022). *Practical clinical biochemistry* (8th ed.). CBS Publishers & Distributors.
2. Plummer, D. T. (2008). *An introduction to practical biochemistry* (3rd ed.). McGraw-Hill Education.
3. Gowenlock, A. H. (2009). *Varley's practical clinical biochemistry* (6th ed.). Arnold.
4. Williams, B. L., & Wilson, K. (2006). *Principles and techniques of practical biochemistry* (3rd ed.). Cambridge University Press.
5. Online literature as per direction of teacher

Teaching Learning Strategies

- Lecturing using white/black board/Multimedia
- Written Assignments/Quiz/Task/Presentation
- Discussion about practical
- Checking the results and discussion

Assignments: Types and Number with Calendar

Assignment, Quiz, Task, Presentation etc.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
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