



UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A ++' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION (25/Oct./Adp./13)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Study in the subject of **Biochemistry** of Semesters I, II and III **Four Year Under Graduate Programme** under as per **NEP-2020 (as given in the annexure)** for the **Regular Candidates** for the examinations to be held in the years as per the details given below:

Subject	Semester	Existing Course Code	New Course Code	For the examinations to be held in the year	%age Change
Biochemistry	Semester-I	UMJBCHT-101	UMJBCHT-101	Dec. 2026, 2027 and 2028	No Change
		UMIBCHT -102	UMIBCHT -102	Dec. 2026, 2027 and 2028	No Change
		UMDBCHT -103	UMDBCHT-103	Dec. 2026, 2027 and 2028	No Change
		USEBCHT -104	USEBCHT- 111	Dec. 2026, 2027 and 2028	100%
	Semester-II	UMJBCHT-201	UMJBCHT-201	May 2027, 2028 and 2029	No Change
		UMIBCHT -202	UMIBCHT -202	May 2027, 2028 and 2029	No Change
		UMDBCHT -203	UMDBCHT -203	May 2027, 2028 and 2029	No Change
		USEBCHT -204	USEBCHT -211	May 2027, 2028 and 2029	100%
	Semester-III	UMJBCHT-301	UMJBCHT-301	Dec. 2027, 2028 and 2029	No Change
		UMJBCHT-302	UMJBCHT-302	Dec. 2027, 2028 and 2029	No Change
		UMIBCHT -303	UMIBCHT -303	Dec. 2027, 2028 and 2029	No Change
		UMDBCHT -304	UMDBCHT -304	Dec. 2027, 2028 and 2029	No Change
		USEBCHT -305	USEBCHT -311	Dec. 2027, 2028 and 2029	100%

The Syllabi of the courses is available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/25/11090-11105

Dated: 23/10/25

Copy for information and necessary action to:

1. Dean, Faculty of Life-Science
2. Convener, Board of Studies in Biotechnology /Biochemistry
3. All members of the Board of Studies
4. Sr. P.A.to the Controller of Examinations
5. Director, CITES&M, University of Jammu for directing the concerned to upload the notification on University Website.
6. C.A. to the Controller of Examinations
7. Director, Computer Centre, University of Jammu.
8. Joint Registrar/Deputy Registrar/Asst. Registrar (Confidential/Exam UG/Exam. Non Prof.)

Bbucoca
10/10/25
Joint Registrar (Academic)

HS
9/11/25
M
7/9/10/25

UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN BIOCHEMISTRY

**For the Examination to be held in Year 2025,
2026 & 2027.**

BIOCHEMISTRY COURSE

UG SEMESTER I & II

UNDER

NEP-2020

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UNIVERSITY OF JAMMU
 SYLLABI AND COURSES OF STUDY IN BIO-CHEMISTRY
 For the examination to be held in December ~~2025~~, 2026, 2027 and 2028
UG SEMESTER-I
 UNDER NEP-2020

S. No	Course Type	Course No.	Course Title	Credits (T+P)	Marks				Total Marks	Percentage syllabus change
					Theory		Practical			
1	Major	UMJBCHT-101	Fundamentals of Biochemistry-I	4 (3T + 1P)	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	Daily Assessment: 10 Marks	Final Exam: 15 Marks	100	-
2	Minor	UMIBCHT-102	Basics of Biochemistry-I	4 (3T + 1P)	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	Daily Assessment: 10 Marks	Final Exam: 15 Marks	100	-
3	Multi-disciplinary	UMDBCHT-103	Nutrition & dietetics	3+0	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	NA	NA	75	-
4	Skill Enhancement	USEBCHT-111	Instrumentation & Biochemical Techniques	3 (25 marks Theory +50 marks Practical)	Mid Semester: 10 Marks	End Semester Exam: 30 Marks		50 Marks	75	100%

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and 2028)
MAJOR COURSE

Course Code: UMJBCHT-101
Course Title: Fundamentals of Biochemistry-I
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25
Duration of Examination: 3 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an introduction to cell biology, role of water in biological systems, Biomolecules and Metabolic concepts. After successful completion of course, the students will be able to understand:

1. Cell theory, Basic cell structure, functions of various cell organelles in eukaryotic cell, Plasma membrane structure and function.
2. Role of water in biochemical reactions occurring within living systems, pH maintenance in living organisms and physiological buffers.
3. Biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids present in the cell.
4. Concept of anabolism, catabolism, amphibolism, energy relationship between synthetic and degradative pathways, characteristics of metabolic pathways.

THEORY

Unit 1: Introduction to Cell Biology

Cell: Atoms to molecules to cell, Major organic compounds of cell, Cell theory, Types of Cell; Prokaryotic and Eukaryotic cell, General organisation of Prokaryotic cell, Eukaryotic Cell structure, An overview of Eukaryotic cellular organelles; Nucleus, Mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, ribosomes, cytosol, Fluid-Mosaic model of Plasma membrane, composition of Plasma membrane, Transport function; active and passive transport, uniport, Symport and Antiport.

Unit 2: Water, pH and Buffers

Water is essential for life, Structure and shape of water molecule, polar nature, Physical properties, Hydrogen bonding, water form hydrogen bonds with polar solutes, water interacts electrostatically with charged solutes, Entropy increases as crystalline substance dissolve, behaviour of Non-Polar gases and compounds with water, hydrophobicity and hydrophilicity; Dissociation constant of water.

Acid- Base; Bronsted- Lowry concept of acids and bases, The pH scale, pH of some aqueous fluids, weak acids and bases their dissociation constant, Buffers; buffer solution, Henderson-Hasselbalch equation and its significance, Physiological buffers; Phosphate buffer system, Bicarbonate buffer system; Maintenance of blood pH.

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and 2028)

MAJOR COURSE

Course Code: UMJBCHT-101

Course Title: Fundamentals of Biochemistry-I

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

Unit 3: Introduction to Biomolecules

Definition, functions and classification of carbohydrates, Oligosaccharides; components and functions of important oligosaccharides; Polysaccharides; components and functions of important polysaccharides, Amino acids: Classifications Proteins: Classification and functions, Physical properties: salting in and salting out, peptide bond, Organization of protein structure into primary, secondary, tertiary and quaternary structures, Lipids: Introduction, classification, properties of Fatty acids, Saturated and unsaturated fatty acids, Essential fatty acids, Triacylglycerol, simple and mixed Triacylglycerol, Nucleic Acids: Introduction, purine and pyrimidine bases, General composition of nucleic acids, nucleosides, nucleotides, DNA, Chargaff's rules of DNA composition, various form of DNA, RNA and its types.

Unit 4: Metabolic Concepts

Definition of metabolism, terminology of metabolism; catabolism, anabolism and amphibolism, classification of general metabolic terms, functions of metabolism, classical subdivisions of metabolism, Metabolic pathways-Schematic representation of linear, irreversible, branched metabolic pathways, catabolic pathway, anabolic pathway, Energy relationship between catabolic and anabolic pathways, catabolism versus anabolism, Unifying themes of metabolic pathways; common activated carriers, key reactions, mode of regulation.

Practicals

1. Safety measures in laboratory.
2. Acquaintance to lab Instruments/equipments, glasswares and plasticwares.
3. Basic expressions denoting the strength of a solution; standard solution, molar solution, molal solution, normal solution, percent solution, ppm solution.
4. Calculation and preparation of standard solutions; molar solution, normal solution and percent solution.
5. Different methods for determination of pH.
6. Principle and working of compound microscope.
7. Micrographs of prokaryotic and Eukaryotic cell.
8. Qualitative tests for carbohydrates.
9. Qualitative tests for aminoacids, proteins.
10. Qualitative tests for lipids.



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2028~~, Dec 2026, Dec 2027 and 2028)

MAJOR COURSE

Course Code: UMJBCHT-101

Course Title: Fundamentals of Biochemistry-I

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Mid Term Assessment test	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Internal Practical	-	-	10 (Based on Daily Performance only)
External Practical	-	-	15

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Cell and Molecular Biology Concepts and Experiments, G. Karp, John Wiley & Sons, Inc. 8th Edition (2015).
2. Lehninger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021).
3. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
4. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
5. An Introduction to Practical Biochemistry, David, T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
6. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
7. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and 2028)

MINOR COURSE

Course Code: UMIBCHT-102
Course Title: Basics of Biochemistry-I
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25
Duration of Examination: 3 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an introduction to cell biology, role of water in biological systems, biomolecules and metabolic concepts. After successful completion of course, the students will be able to understand:

1. Cell theory, Basic cell structure, functions of various cell organelles in eukaryotic cell, Plasma membrane structure and function.
2. Role of water in biochemical reactions occurring within living systems, pH maintenance in living organisms and physiological buffers.
3. Biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids present in the cell.
4. Concept of anabolism, catabolism, amphibolism, energy relationship between synthetic and degradative pathways, characteristics of metabolic pathways.

THEORY

Unit 1: Introduction to Cell Biology

Cell: Atoms to molecules to cell, Major organic compounds of cell, Cell theory, Types of Cell; Prokaryotic and Eukaryotic cell, General organisation of Prokaryotic cell, Eukaryotic Cell structure, An overview of Eukaryotic cellular organelles; Nucleus, Mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, ribosomes, cytosol, Fluid-Mosaic model of Plasma membrane, composition of Plasma membrane, Transport function; active and passive transport, uniport, Symport and Antiport.

Unit 2: Water, pH and Buffers

Water is essential for life, Structure and shape of water molecule, polar nature, Physical properties, Hydrogen bonding, water form hydrogen bonds with polar solutes, water interacts electrostatically with charged solutes, Entropy increases as crystalline substance dissolve, behaviour of Non-Polar gases and compounds with water, hydrophobicity and hydrophilicity; Dissociation constant of water.

Acid- Base; Bronsted- Lowry concept of acids and bases, The pH scale, pH of some aqueous fluids, weak acids and bases their dissociation constant, Buffers; buffer solution, Henderson-Hasselbalch equation and its significance, Physiological buffers; Phosphate buffer system, Bicarbonate buffer system; Maintenance of blood pH.



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~ Dec 2026, Dec 2027 and 2028)

MINOR COURSE

Course Code: UMIBCHT-102
Course Title: Basics of Biochemistry-I
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25
Duration of Examination: 3 hrs

Unit 3: Introduction to Biomolecules

Definition, functions and classification of carbohydrates, Oligosaccharides; components and functions of important oligosaccharides; Polysaccharides; components and functions of important polysaccharides, Amino acids: Classifications Proteins: Classification and functions, Physical properties: salting in and salting out, peptide bond, Organization of protein structure into primary, secondary, tertiary and quaternary structures, Lipids: Introduction, classification, properties of Fatty acids, Saturated and unsaturated fatty acids, Essential fatty acids, Triacylglycerol, simple and mixed Triacylglycerol, Nucleic Acids: Introduction, purine and pyrimidine bases, General composition of nucleic acids, nucleosides, nucleotides, DNA, Chargaff's rules of DNA composition, various form of DNA, RNA and its types.

Unit 4: Metabolic Concepts

Definition of metabolism, terminology of metabolism; catabolism, anabolism and amphibolism, classification of general metabolic terms, functions of metabolism, classical subdivisions of metabolism, Metabolic pathways; Schematic representation of linear, irreversible, branched metabolic pathways, catabolic pathway, anabolic pathway, Energy relationship between catabolic and anabolic pathways, catabolism versus anabolism, Unifying themes of metabolic pathways; common activated carriers, key reactions, mode of regulation.

Practicals

1. Safety measures in laboratory.
2. Acquaintance to lab Instruments/equipments, glasswares and plasticwares.
3. Basic expressions denoting the strength of a solution; standard solution, molar solution, molal solution, normal solution, percent solution, ppm solution.
4. Calculation and preparation of standard solutions; molar solution, normal solution and percent solution.
5. Different methods for determination of pH.
6. Principle and working of compound microscope.
7. Micrographs of prokaryotic and Eukaryotic cell.
8. Qualitative tests for carbohydrates.
9. Qualitative tests for aminoacids, proteins.
10. Qualitative tests for lipids.



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and 2028)

MINOR COURSE

Course Code: UMIBCHT-102
Course Title: Basics of Biochemistry-I
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25
Duration of Examination: 3 hrs

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Internal Theory Assessment	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Internal Practical	-	-	10 (Based on Daily Performance only)
External Practical	-	-	15

A) **Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours**

B) **External End Semester Examination: (60 Marks) Time Allotted 3 Hours**

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Cell and Molecular Biology Concepts and Experiments, G. Karp, John Wiley & Sons, Inc. 8th Edition (2015).
2. Lehninger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021).
3. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
4. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
5. An Introduction to Practical Biochemistry, David, T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
6. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
7. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).



University of Jammu
Syllabi of Bio-Chemistry for FYUP ~~under CBCS~~ as per NEP-2020
Semester – I

(Examination to be held in Dec 2025, Dec 2026, Dec 2027 and Dec 2028)

MULTIDISCIPLINARY COURSE

Course Code: UMDBCHT-103
Course Title: Nutrition and Dietetics
Credits: 3
Total No. of Lectures: Theory: 45 hours
Maximum Marks: 75
Theory: 75
Duration of Examination: 3 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides knowledge of nutrition and diet. After successful completion of course, the students will be able to understand:

1. Functions of food, food pyramid, concept of nutrition, RQ of food stuff, Basal Metabolic Rate, composition of balance diet, RDA for different age groups.
2. Nutritional significance of carbohydrates, amino acids, proteins, lipids in diet.
3. Nutritional significance of Macro elements and trace elements and their nutritional deficiencies.
4. Principles of diet therapy, diet therapy for various life style disease and Protein energy malnutrition.

THEORY

Unit 1 Introduction to Nutrition

Food- functions of food, food groups, food pyramid, Nutrition; Ideal, under and over nutrition, Nutrition and Energy supply; Energy content of foods, Respiratory Quotient of foodstuffs, Utilization of energy in man; Basal Metabolic Rate (BMR), factors affecting BMR, significances of BMR, Energy requirements for different physical activities, Composition of Balanced Diet, Recommended Dietary allowances RDA for Infants, Children, Adolescent, Adult male, female, Pregnant, Lactating women and old age.

Unit 2: Elements of Nutrition-I

Dietary Carbohydrates; Composition, Physiological Functions, food sources, digestion, lactose intolerance, dietary requirements, Dietary fibre; types, Benefits and adverse affects.

Dietary lipids; Classification, sources, functions, essential fatty acids; functions of EFA, RDA, deficiency of EFA, Cholesterol in the body, saturated and unsaturated fattyacids.

Dietary Proteins; Composition, Physiological role of proteins in the body, Essential, Semi essential and nonessential amino acids, Food source and RDA of proteins for different age group, Biological value of proteins, Nitrogen balance.

Unit 3: Elements of Nutrition-II

General functions and classification, biochemical functions, dietary requirements, sources and disease states of principle elements-Ca, P, Na, K, biochemical functions, dietary requirements, sources and disease states of trace elements- Fe, I and Zn.

Unit 4: Dietetics

Principles of Dietetics, therapeutic diets for anaemia, heart diseases, obesity and diabetes mellitus, Protein Energy Malnutrition (Kwashiorkor), Undernutrition (Marasmus) their preventive and curative measures.



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and Dec. 2028)

MULTIDISCIPLINARY COURSE

Course Code: UMDBCHT-103
Course Title: Nutrition and Dietetics
Credits: 3
Total No. of Lectures: Theory: 45 hours
Maximum Marks: 75
Theory: 75
Duration of Examination: 3 hrs

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Internal Theory Assessment	50%	1½ Hours	15
External Theory End Semester	100%	3 Hours	60

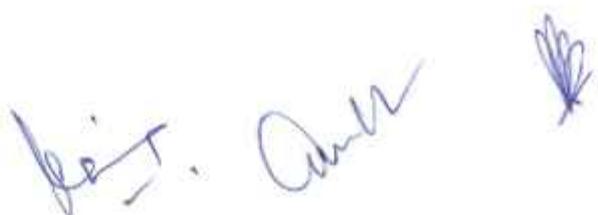
A) **Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours**

B) **External End Semester Examination: (60 Marks) Time Allotted 3 Hours**

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Krause's Food and the Nutrition Care Process, Mahan, and Raymond, Elsevier. 14th Edition (2016).
2. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
3. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
4. Nutrition and Dietetics, S. A. Joshi, McGraw-Hill Education, 5th Edition (2021).
5. Food Biochemistry, J. K. Dickson, CBS Publisher & Distributor Pvt. Ltd. 1st Edition (2020).



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – I

(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and Dec 2028)

SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-111

Course Title: Instrumentation and Biochemical Techniques

Credits: 3 (25 marks Theory+50 marks Practical)

Total No. of Lectures: Theory: 25 hours

Practical: 30 hours

Maximum Marks: 75

Theory: 25

Practical: 50

Duration of Examination: 2.30 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides knowledge of Laboratory Instruments and Biochemical techniques. After successful completion of course, the students will be able to understand:

1. Principle and working of various laboratory instruments/equipments.
2. Various biochemical techniques and their applications in separation of chemicals like biomolecules, organic chemicals, drugs etc.
3. Application of immunological techniques in Medical field.

THEORY

Unit 1: Instrumentation

Laboratory safety rules and regulations, Principle and Working of; Weighing balance, pH meter, Laminar air flow, Autoclave, Hot-air oven, Bacteriological incubator, Colony counter, Haemocytometer, Water bath, Bunsen burner, Compound microscope, Usage and care of Glass wares, Serological pipettes, micro pipettes, centrifuges, Spectrophotometer; Principle, Components, working of spectrophotometer.

Unit 2: Biochemical Techniques

Cell Fractionation; Tissue Homogenisation, Separation of Cell organelles from homogenate, Centrifugation; Principles of centrifugation, various types of centrifuges, application of centrifugation, Spectroscopy; Lambert's Law, Beer's Law, applications of UV-visible absorption spectrophotometry in biochemistry, Chromatography; General Principle and application, Principle and application of TLC, Adsorption chromatography, Molecular sieve chromatography, Paper chromatography, Electrophoresis; General Principle, Factors affecting migration of molecules, Technique/steps involve in electrophoresis, Basic principles of agarose gel electrophoresis, Immunotechniques; Principle and applications of Precipitation reactions, agglutinations, Immunofluorescence, Enzyme linked immunosorbant assays (ELISA), Types of ELISA.

Practicals:

1. Verification of Beer-Lambert Law.
2. Demonstration and working of Spectrophotometer.
3. Determination of absorption maxima (λ_{max}) of small molecules and macromolecules.
4. Separation of amino-acids by Paper chromatography/TLC.
5. Preparation agarose gel, Electrophoresis.
6. Perform Blood grouping test.
7. Demonstration of ELISA.
8. Demonstration and operation Centrifugation.

University of Jammu
Syllabi of Bio-Chemistry for FYUP under
CBCS as per NEP-2020 Semester – I
(Examination to be held in Dec ~~2025~~, Dec 2026, Dec 2027 and Dec. 2028)
SKILL ENHANCEMENT COURSE

Course Code: USEBCHT111
Course Title: Instrumentation and
Biochemical Techniques Credits: 3 (25 marks
Theory+50 marks Practical)
Total No. of Lectures:
Theory: 25 hours **Practical:**
30 hours
Maximum Marks: 75
Theory: 25
Practical: 50
Duration of Examination: 2.30 hrs

NOTE FOR PAPER SETTING: Note for paper setting for mid-term examination part - 1: The question paper will of 25 marks. There will be two sections in the question paper with pattern as follow: Section A shall comprise of 4 short answer type questions of (2.5 Marks each) covering all three units with at least one question from each unit. The students have to attempt all 4 questions from section A. Section B shall be comprise of a total of 6 questions with two questions selected from each unit. Each question shall be of 5 marks. The students have to attempt three questions selecting only one question from each unit. Evaluation of skills: Final examination part 2: The evaluation of skill will be internal. The examination of skill shall be of 50 marks. The evaluation of skill will be done internally through the board of three members (including the trainer of the course).

Suggested Books:

1. Principles and Techniques of Biochemistry and Molecular Biology, Wilson and Walker, Cambridge University Press. 8th Edition (2018).
2. Experimental Biochemistry, J. M. Clark, W. H. Freeman and Co. New York. 3rd Edition (1999).
3. Immunology, Kubly et al., W. H. Freeman and company, New York. 7th Edition (2014).
4. Principles of Molecular Biology, V. B. Rastogi, Medtech. 2nd Edition (2016).
5. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
6. An Introduction to Practical Biochemistry, David, T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
7. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
8. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in May ~~2026~~, May 2027, May 2028 and 2029)

UG SEMESTER-II

UNDER NEP-2020

S. No.	Course Type	Course No.	Course Title	Credits (T+P)	Marks				Total Marks	Percentage syllabus change
					Theory		Practical			
1	Major	UMJBC HT-201	Fundamentals of Biochemistry-II	4 (3T + 1P)	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	Daily Assessment: 10 Marks	Final Exam: 15 Marks	100	-
2	Minor	UMIBC HT-202	Basics of Biochemistry-II	4 (3T + 1P)	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	Daily Assessment: 10 Marks	Final Exam: 15 Marks	100	-
3	Multi disciplinary	UMDB CH T-203	Vitamins & Hormones	3+0	Mid Semester: 15 Marks	End Semester Exam: 60 Marks	NA	NA	75	-
4	Skill Enhancement	USEBC HT-211	Basic Medical Lab Technology	3 (25 marks Theory + 50 marks Practical)	Mid Semester:	End Semester Exam:			75	100

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in May ~~2020~~, May 2027, May 2028 and May-2029)

MAJOR COURSE

Course Code: UMJBCHT-201

Course Title: Fundamentals of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an introduction to Nutritional Biochemistry, Enzymes, Molecular Biology and Immunology. After successful completion of course, the students will be able to understand:

1. Functions of food, food pyramid, concept of nutrition, RQ of food stuff, Basal Metabolic Rate, composition of balance diet, RDA for different age groups. Nutritional significance of carbohydrates, amino acids, proteins, lipids in diet, Macro elements and trace elements and their nutritional deficiencies.
2. Fundamental knowledge on enzymes and their importance in biological systems.
3. Knowledge related to discovery of DNA as genetic material, DNA replication, transcription, translation, genetic code and mutation.
4. Overview of different types of immunity, cells of immune system, Antigens, Antibodies. They will be acquainted with importance of antigen-antibody interactions in disease diagnosis.

THEORY

Unit 1: Nutritional Biochemistry

Food- functions of food, food groups, food pyramid, Nutrition definition, Energy content of foods, Respiratory Quotient of foodstuffs, Utilization of energy in man; Basal Metabolic Rate (BMR), factors affecting BMR, significances of BMR, Energy requirements for different physical activities, Composition of Balanced Diet, Nutritional and physiological functions of Carbohydrates, proteins and lipids, Nitrogen Balance, biochemical functions and disease state of minerals (Ca, P, Na, K, Fe, I, Zn).

MAJOR COURSE



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in May ~~2026~~, May 2027, May 2028) and 2029

Course Code: UMJBCHT-201

Course Title: Fundamentals of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

Unit 2: An Introduction to Enzymes

Classification and nomenclature of enzymes, Chemical nature and properties of enzymes, isoenzymes, active site, factors affecting enzymes activity; substrate concentration, enzyme concentration, pH and temperature, mechanism of enzyme action; Lock and key model, Induced fit theory, concept of enzyme inhibition. Allosteric enzymes, application of enzymes.

Unit 3: Basic Molecular Biology

Evidence that DNA is genetic material, features of Watson and Crick model of DNA, Central dogma; General overview of DNA replication, transcription and translation in prokaryotes, Genetic code and its characteristics, Concept of reverse transcription, Mutations and its types.

Unit 4: Immunology

Immunity; Innate and Acquired immunity, Active and Passive immunity, Concept of vaccine, Introduction to Central and peripheral lymphoid organs, B-cells and T-cells, Antigens; types of antigens, Antibodies; MHC complex, General structure of antibody, antigen- antibody reaction; Precipitation, Agglutination, Immunofluorescence, ELISA, definition of Hypersensitivity, allergy, sensitizing dose and shocking dose.

Practicals

1. General Handling of enzymes.
2. Verification of Beer-Lambert law.
3. Principle and Working of UV-Visible spectrophotometer.
4. Preparation of standard curve for maltose.
5. Study of activity of salivary amylase under optimum conditions.
6. Estimation of Vitamin C by titration method.
7. Isolation of Plasmid DNA/Genomic DNA.
8. To know the blood group from blood sample.

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II
(Examination to be held in May ~~2020~~, May 2027, May 2028 and 2029)

MAJOR COURSE

Course Code: UMJBCHT-201

Course Title: Fundamentals of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

9. To know the Rh factor from blood sample.

10. Demonstration of ELISA.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Mid Term Assessment test	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Internal Practical	-	-	10 (Based on Daily Performance only)
External Practical	-	-	15

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Semester – II

(Examination to be held in May ~~2026~~, May 2027, May 2028) and May 2028

MAJOR COURSE

Course Code: UMJBCHT-201

Course Title: Fundamentals of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Krause's Food and the Nutrition Care Process, Mahan, and Raymond, Elsevier. 14th Edition (2016).
2. Biochemistry, Biotechnology and Clinical Chemistry, T. Palmer and P. Bonner, Woodhead Publishing Limited. 2nd Edition (2007).
3. Lehninger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021).
4. Molecular Biology of the Gene. James D. Watson et al., Cold Spring Harbor Laboratory (CSHL) Press. 7th Edition (2017).
5. Immunology, Kuby et al., W. H. Freeman and company, New York. 7th Edition (2014).
6. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
7. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
8. Textbook of Microbiology, C. P. Baveja, Arya Publications. 6th Edition (2019).

University of Jammu
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Semester – II

(Examination to be held in ~~May 2026~~ May 2027, May 2028 and *May 2029*)

9. Nutrition and Dietetics, S. A. Joshi, McGraw-Hill Education, 5th Edition (2021).
10. Food Biochemistry, J. K. Dickson, CBS Publisher & Distributor Pvt. Ltd. 1st Edition (2020).
11. Enzymology, T. Devasena. Oxford University Press. 1st Edition (2015).
12. Understanding Enzymes: An Introductory Text, A. Arya, A. Kumar and J. Jha, Drawing Pin Publishing, New Delhi, India, 1st Edition (2018).
13. An Introduction to Practical Biochemistry, David, T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
14. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
15. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).

University of Jammu
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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028 and May 2029)

MINOR COURSE

Course Code: UMIBCHT-202

Course Title: Basics of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an introduction to Nutritional Biochemistry, Enzymes, Molecular Biology and Immunology. After successful completion of course, the students will be able to understand:

1. Functions of food, food pyramid, concept of nutrition, RQ of food stuff, Basal Metabolic Rate, composition of balance diet, RDA for different age groups. Nutritional significance of carbohydrates, amino acids, proteins, lipids in diet, Macro elements and trace elements and their nutritional deficiencies.
2. Fundamental knowledge on enzymes and their importance in biological systems.
3. Knowledge related to discovery of DNA as genetic material, DNA replication, transcription, translation, genetic code and mutation.
4. Overview of different types of immunity, cells of immune system, Antigens, Antibodies. They will be acquainted with importance of antigen-antibody interactions in disease diagnosis.

THEORY

Unit 1: Nutritional Biochemistry

Food- functions of food, food groups, food pyramid, Nutrition definition, Energy content of foods, Respiratory Quotient of foodstuffs, Utilization of energy in man; Basal Metabolic Rate (BMR), factors affecting BMR, significances of BMR, Energy requirements for different physical activities, Composition of Balanced Diet, Nutritional and physiological functions of Carbohydrates, proteins and lipids, Nitrogen Balance, biochemical functions and disease state of minerals (Ca, P, Na, K, Fe, I, Zn).

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028) and May 2029

MINOR COURSE

Course Code: UMIBCHT-202

Course Title: Basics of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

Unit 2: An Introduction to Enzymes

Classification and nomenclature of enzymes, Chemical nature and properties of enzymes, isoenzymes, active site, factors affecting enzymes activity; substrate concentration, enzyme concentration, pH and temperature, mechanism of enzyme action; Lock and key model, Induced fit theory, concept of enzyme inhibition, Allosteric enzymes, application of enzymes.

Unit 3: Basic Molecular Biology

Evidence that DNA is genetic material, features of Watson and Crick model of DNA, Central dogma; General overview of DNA replication, transcription and translation in prokaryotes, Genetic code and its characteristics, Concept of reverse transcription, Mutations and its types.

Unit 4: Immunology

Immunity; Innate and Acquired immunity, Active and Passive immunity, Concept of vaccine, Introduction to Central and peripheral lymphoid organs, B-cells and T-cells, Antigens; types of antigens, Antibodies; General structure of antibody, antigen- antibody reaction; Precipitation, Agglutination, Immunofluorescence, ELISA, definition of Hypersensitivity, allergy, sensitizing dose and shocking dose.

Practicals

1. General Handling of enzymes.
2. Verification of Beer-Lambert law.
3. Principle and Working of UV-Visible spectrophotometer.
4. Preparation of standard curve for maltose.
5. Study of activity of salivary amylase under optimum conditions.
6. Estimation of Vitamin C by titration method.
7. Isolation of Plasmid DNA/Genomic DNA.

University of Jammu
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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028 and May 2029)

MINOR COURSE

Course Code: UMIBCHT-202

Course Title: Basics of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

1. To know the blood group from blood sample.
2. To know the Rh factor from blood sample.
3. Demonstration of ELISA.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Internal Theory Assessment	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Internal Practical	-	-	10 (Based on Daily Performance only)
External Practical	-	-	15

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

a) External End Semester Theory Examination will have two sections (A & B).

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028 and *May - 2029*)

MINOR COURSE

Course Code: UMIBCHT-202

Course Title: Basics of Biochemistry-II

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Duration of Examination: 3 hrs

- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions, one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- b) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Krause's Food and the Nutrition Care Process, Mahan, and Raymond, Elsevier. 14th Edition (2016).
2. Biochemistry, Biotechnology and Clinical Chemistry, T. Palmer and P. Bonner, Woodhead Publishing Limited. 2nd Edition (2007).
3. Lehninger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021).
4. Molecular Biology of the Gene. James D. Watson et al., Cold Spring Harbor Laboratory (CSHL) Press. 7th Edition (2017).
5. Immunology, Kuby et al., W. H. Freeman and company, New York. 7th Edition (2014).
6. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
7. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
8. Textbook of Microbiology, C. P. Baveja, Arya Publications. 6th Edition (2019).
9. Nutrition and Dietetics, S. A. Joshi, McGraw-Hill Education, 5th Edition (2021).
10. Food Biochemistry, J. K. Dickson, CBS Publisher & Distributor Pvt. Ltd. 1st Edition (2020).
11. Enzymology, T. Devasena. Oxford University Press. 1st Edition (2015).

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – II

(Examination to be held in ~~May 2026~~ May 2027, May 2028 and May 2029)

MULTIDISCIPLINARY COURSE

Course Code: UMDBCCHT-203

Course Title: Vitamins and Hormones

Credits: 3

Total No. of Lectures: Theory: 45 hours

Maximum Marks: 75

Theory: 75

Duration of Examination: 3 hrs

12. Understanding Enzymes: An Introductory Text, A. Arya, A. Kumar and J. Jha, Drawing Pin Publishing, New Delhi, India, 1st Edition (2018).
13. An Introduction to Practical Biochemistry, David, T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
14. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
15. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides knowledge of Vitamins and Hormones. After successful completion of course, the students will be able to understand:

1. Importance of fat and water soluble vitamins in growth and development, their recommended dietary allowance, dietary source and deficiency diseases.
2. Various Hormones released by endocrine glands their importance and disorders due to imbalance.

THEORY

Unit 1: Fat Soluble Vitamins

Definition, historical background, general characteristics, classification, vitamins, fat soluble vitamins- A, D, E and K, biochemical functions, recommended dietary allowance, dietary source and deficiency diseases.

Unit 2: Water Soluble Vitamins

Water soluble vitamins; Vitamin-C and B-Complex- Thiamine, Riboflavin, Niacin, Pantothenic acid, Pyridoxine, Biotin, Folic acid, Vitamin B12, biochemical functions, Recommended Dietary Allowance, dietary source and deficiency, vitamins like compounds; PABA, bioflavonoids, antivitamins.

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Semester – II

(Examination to be held in ~~May 2020~~, May 2027, May 2028 and 2029)

MULTIDISCIPLINARY COURSE

Course Code: UMDBCHT-203

Course Title: Vitamins and Hormones

Credits: 3

Total No. of Lectures: Theory: 45 hours

Maximum Marks: 75

Theory: 75

Duration of Examination: 3 hrs

NOTE FOR PAPER SETTING

Unit 3: Vertebrate Hormones-I

Introduction, classification, mechanism of action of steroid hormones, Hypothalamic Hormones; TRH, CRH and GnRH, Anterior and Posterior pituitary hormones; Growth Hormone, Glycoprotein hormones, oxytocin- their functions and disorders due to imbalance.

Unit 4: Vertebrate Hormones-II

Thyroid hormone, Hormones of adrenal cortex, Hormones of Gonads; androgens, estrogens and Progesterone - their functions and disorders due to imbalance, Insulin, Insulin-mediated glucose transport, regulation of blood glucose, sources of blood glucose, Diabetes Mellitus; classification, glucose tolerance test, comparison of two types of diabetes mellitus, glycosuria, metabolic changes in diabetes, management.

Examination Theory/Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Internal Theory Assessment	50%	1½ Hours	15
External Theory End Semester	100%	1.1 Hours	60

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.

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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028, and May - 2029)

- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. The Vitamins: Fundamental Aspects in Nutrition and Health, F. C. Gerald and J. P. McClung, Elsevier-Academic Press. 5th Edition (2017).
2. Nutritional Biochemistry of Vitamins, D. A. Bender, Cambridge University Press, 2nd Edition (2003).
3. Principles of Anatomy and Physiology, G. J. Tortora, and B. Derrickson, John Wiley and Sons, Inc. 14th Edition (2013).
4. Guyton and Hall Textbook of Medical Physiology, J. E. Hall, Elsevier Saunders, 13th Edition (2015).
5. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
6. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).

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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028 and May 2029)

SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-211

Course Title: Basic Medical Lab Technology

Credits: 3 (25 marks Theory+50 marks Practical)

Total No. of Lectures: Theory: 25 hours

Practical: 30 hours

Maximum Marks: 75

Theory: 25

Practical: 50

Duration of Examination: 2.30 hrs

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides knowledge of Good Laboratory Practices and Analysis of Blood and Urine. After successful completion of course, the students will be able to understand:

1. Hazards in clinical laboratory, reagents preparation, labelling, storage.
2. Sterilization and disinfection of laboratory and laboratory instruments. Quality control in laboratory.
3. Composition, collection and analysis of blood and urine.

THEORY

Unit-1: Good Laboratory Practice & Quality Control

Hazards in clinical laboratory, chemicals/Reagents, preparation of reagents, Labelling, storage and usage, First Aid in laboratory accidents - Precautions and first aid equipments, Reporting laboratory tests and keeping records, Sterilization and disinfection, General approach to quality control, unit and reference values, determination of pH.

Unit-2: Analysis of Biological samples

Urine Analysis: Composition, collection, preservation, physical examination, interfering factors, chemical examination, sugar in urine, ketone bodies in urine, bile pigments, uric acid, and microscopic examination of the urinary sediment.

Clinical Hematology: Collection of blood - Anticoagulant, preservation, Estimation of blood glucose, Hb, PCV, WBC, RBC, Platelets, ESR, Clotting time, bleeding time-normal value, clinical interpretations, Blood grouping- ABO system, ABO Grouping, Rh typing, Coomb's test.



University of Jammu
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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028) and May 2029

SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-211

Course Title: Basic Medical Lab Technology

Credits: 3 (25 marks Theory+50 marks Practical)

Total No. of Lectures: Theory: 25 hours

Practical: 30 hours

Maximum Marks: 75

Theory: 25

Practical: 50

Duration of Examination: 2.30 hrs

Practicals:

1. Basic expressions denoting the strength of a solution; standard solution, molar solution, molal solution, normal solution, percent solution, ppm solution.
2. Calculation and preparation of standard solutions; molar solution, normal solution and percent solution.
3. Different methods to determine pH.
4. Determination of blood sugar by Glucometer.
5. RBC counting.
6. WBC counting.
7. Determination of clotting time and its significance.
8. To perform Blood grouping test.

University of Jammu
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Semester – II

(Examination to be held in ~~May 2026~~, May 2027, May 2028) and May 2029

SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-211
Course Title: Basic Medical Lab Technology
Credits: 3 (25 marks Theory+50 marks Practical)
Total No. of Lectures: Theory: 25 hours
Practical: 30 hours
Maximum Marks: 75
Theory: 25
Practical: 50
Duration of Examination: 2.30 hrs

NOTE FOR PAPER SETTING

Note for paper setting for midterm examination part -1: The question paper will of 25 marks. There will be two sections in the question paper with pattern as follow: Section A shall comprise of 4 short answer type questions of (2.5 Marks each) covering all three units with at least one question from each unit. The students have to attempt all 4 questions from section A. Section B shall be comprise of a total of 6 questions with two questions selected from each unit. Each question shall be of 5 marks. The students have to attempt three questions selecting only one question from each unit. Evaluation of skills: Final examination part 2: The evaluation of skill will be internal. The examination of skill shall be of 50 marks. The evaluation of skill will be done internally through the board of three members (including the trainer of the course).

Suggested Books:

1. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech, 2nd Edition (2018).
2. Practical Textbook of Biochemistry for Medical Students, D. M. Vasudevan and S. K. Das, Jaypee Brothers Medical Publishers (P) Ltd. 3rd Edition (2020).
3. Practical Clinical Biochemistry; Methods and Interpretations, R. Chawla, Jaypee Brothers Medical Publisher (P) Ltd. 5th Edition (2020).
4. An Introduction to Practical Biochemistry, D. T. Plummer, Mc Graw Hill Education (India) Pvt. Ltd. 3rd Edition (2017).
5. A Textbook of Practical Physiology, C. L. Ghai, Jaypee Brothers Medical Publisher (P) Ltd. 8th Edition (2013).
6. Practical Clinical Biochemistry, S. Mohanty and A. B. Varma, Jaypee Brothers Medical Publisher (P) Ltd. 1st Edition (2013).
7. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).



UNIVERSITY OF JAMMU
 SYLLABI AND COURSES OF STUDY IN BIO-CHEMISTRY
 For the examination to be held in ~~December 2026~~, 2027 & 2028 + 2029
 UG SEMESTER-III Dec
 UNDER NEP-2020

S. No.	Course Type	Course No.	Course Title	Credits (T+P)	Marks				Total Marks	Percent Syllabus Change
					Theory		Practical			
1	Major	UMJ BCH T-301	Chemical Foundation of Biochemistry	4 (3T + 1P)	Mid Semester :15 Marks	End Semester Exam: 60 Marks	Daily Assessment:10 Marks	Final Exam: 15 Marks	100	15
2	Major	UMJ BCH T-302	Chemistry of Biomolecules	4 (3T + 1P)	Mid Semester :15 Marks	End Semester Exam: 60 Marks	Daily Assessment:10 Marks	Final Exam: 15 Marks	100	-
3	Minor	UMI BCH T-303	Biomolecules	4 (3T + 1P)	Mid Semester :15 Marks	End Semester Exam: 60 Marks	Daily Assessment:10 Marks	Final Exam: 15 Marks	100	-
4	Multidisciplinary	UM DBC HT-304	Biochemistry in Health and Disease	3+0	Mid Semester :15 Marks	End Semester Exam: 60 Marks	NA	NA	75	-
5	Skill Enhancement	USE BCH T-311	Biochemical Diagnostics	3(25 marks theory+ 50 marks Practical)	Mid Semester Exam:	End Semester Exam:			75	100

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – III

(Examination to be held in December ~~2026~~ 2027 & 2028 *and 2029*)

MAJOR COURSE

Course Code: UMJBCHT-301
Course Title: Chemical Foundation of Biochemistry
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course will instil confidence and clarity of mind in students to understand the chemical structures of Biomolecules and Biological reactions. After successful completion of course, the students will be able to:

1. understand fundamental properties of elements, their role in formation of biomolecules and in chemical reactions within living organisms.
2. understand the concepts of mole, mole fraction, molarity, etc. and to apply them in preparations of solutions of desired strengths.
3. refresh fundamentals of chemical bonds, electronic configuration, theories of bond formation.
4. understand the fundamentals of chemical processes in biological systems.
5. appreciate the roles of metals, non-metals, transition metals and coordination compounds in biological systems.

Unit 1: Atomic Structure and Chemical Bonding

Elements essential for life, Structure of an atom, Orbit and orbitals, shells and subshell. Illustration of Pauli's exclusion principle, Aufbau principle, and Hund's rule, octet rule. Chemical bonding; non-covalent and covalent bonds, hydrogen bonds, ionic bonds, van der Waals interactions, electrostatic interactions, and hydrophobic interactions with reference to biological systems, outline of theories of bonding: valence bond theory, molecular orbital theory and crystal field theory.

Unit 2: Electrochemistry and Redox Reactions

Electrochemical cells and types, Electrode, Standard electrode potential and its measurement, Laws of thermodynamics, entropy, enthalpy, Gibb's energy and their relation; General oxidation-reduction reactions, types of biological oxidation-reduction reactions, redox potential of some biological redox systems, Endergonic and exergonic reactions with biological examples, their importance in biological systems, oxidation and reduction of iron in haemoglobin, biological role of NAD^+/NADH , $\text{NADP}^+/\text{NADPH}$, FAD/FADH^2 , FMN/FMNH^2 .

Unit 3: Organic Compounds and their Nomenclatures

Organic compounds: classification, IUPAC nomenclature, compounds containing one, two functional groups, Isomerism, geometrical and structural isomerism D&L isomers of monosaccharaides and amino acids, Optical isomerism, Enantiomers, epimers, racemic mixture, Fischer and Newmann projection formulae with reference to carbohydrates, molecule with one and two chiral and achiral centres. R & S system of classification of amino acids.



University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – III

(Examination to be held in December ~~2020~~, 2027 & 2028 and 2029)

MAJOR COURSE

Course Code: UMJBCHT-301

Course Title: Chemical Foundation of Biochemistry

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

Unit 4: Inorganic Chemistry and Organometallic Compounds

Inorganic molecules and coordination compounds: nomenclature and formula. Central metal ion, ligand, coordination number, sphere, complex ion, oxidation number of central atoms, Ionization, solvate (hydrate), Porphyrins and Metal ions: Role of metal ions in biological systems, Fe, Cu, structure and functions of porphyrins, metalloporphyrin and iron-sulphur clusters with suitable examples and their role in biological systems.

Practicals:

1. Calibration of volumetric glassware burette, pipette, standard flasks).
2. Concept of molarity, molality and normality. Calculation and preparation of molar solutions, normal solutions, percent solutions and dilute solutions.
3. Preparation of standard Sodium carbonate solution, standardization of HCl (Methyl orange) and estimation of NaOH in the given solution (Methyl orange or phenolphthalein).
4. Preparation of standard Potassium dichromate and estimation of ferrous/ferric mixture using diphenylamine indicator.
5. Preparation of buffer; phosphate, bicarbonate and acetate buffers.
6. Verification of Beer's Law. (i) Estimation of unknown concentration of a biomolecule by using colorimeter (ii) Determination of molar extinction coefficient.
7. Calibration of pH meter and determination of pH of few solutions.

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Mid Term Assessment test	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Daily Practical Evaluation	-	-	10 (Based on Daily Performance only)
Final Practical Exam	-	-	15 (10 Marks Test & 5 Marks Viva)

University of Jammu
Syllabi of Bio-Chemistry for FYUP under CBCS as per NEP-2020
Semester – III

(Examination to be held in December ~~2026~~, 2027 & 2028) and 2029
MAJOR COURSE

Course Code: UMJBCHT-301

Course Title: Chemical Foundation of Biochemistry

Credits: 4 (3Theory+1Practical)

Total No. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical: 25

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).
- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Vogel's textbook of quantitative chemical analysis, Vogel, A.I., Mendhan, J., Denney, R.C. and Barnes, J.D., Prentice Hall, 6s Edition (2000).
2. Physical Chemistry, Atkins, P., de Paula, J. and Keeler, J., W.H. Freeman and Company, International Edition (2018).
3. Inorganic Chemistry: Principles of Structure and Reactivity, Huheey, J.E., Keiter, E.A., Keiter, R.L. and Medhi, K.O., Pearson Education India 5th Edition (2022).
4. Stereochemistry: Conformation and Mechanism, Kalsi, P.S., New Age International Publications, 11th Edition (2022).
5. Introduction to Stereochemistry, Mislow, K., Dover Publications (2012).
6. A Text book of Organic Chemistry, Bansal, R.K., New Age International Publications, 6th Edition (2016).
7. Advanced Inorganic Chemistry, Cotton, F.A., Wilkinson, G., Murillo, C.A. and Bochmann, M. A, Wiley, 6th Edition (2007).
8. Principles of organometallic Chemistry, P. Powell, ELBS, 2nd Edition (1991).
9. Inorganic Chemistry, 2022, 32nd Edition, J.E. Huheey, Harper International.
10. Organic Chemistry, Claden J., Greeves, N. and Waren, S., Oxford University Press, 2nd Edition (2020).
11. Inorganic Chemistry, 1987, R.W. Hay, Ellis Harwood.
12. Bioinorganic Chemistry, Roat-Malone, R.M., John-Wiley, 3rd Edition (2002).

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Semester – III

(Examination to be held in December ~~2026~~, 2027 & 2028 and 2029)

MAJOR COURSE

Course Code: UMJBCHT-302
Course Title: Chemistry of Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides detailed aspect of Biomolecules. After successful completion of course, the students will be able to:

1. Understand the classification, properties of carbohydrates, amino acids, proteins, lipids, cholesterol, DNA, RNA, glycoproteins, glycolipids and their importance in biological systems.
2. Understand the structure of Monosaccharides, Oligosaccharides, Polysaccharides, amino acids.
3. Identify the various biomolecules in the laboratory.
4. Understand the level of protein architecture i.e. Primary, Secondary, Tertiary and Quaternary.

Unit 1: Carbohydrates

Definition, importance, detailed classification of carbohydrates, Isomerism in carbohydrates, structure of monosaccharides, Open and Ring structure of Aldoses and Ketoses, Anomeric forms, mutarotation, Reaction of monosaccharides with special reference to glucose, reducing and non-reducing sugars, Oligosaccharides; classification, structure and functions of important oligosaccharides; Maltose, Lactose, Sucrose, lactose intolerance. Polysaccharides: classification, structure and functions of storage and structural polysaccharides, sugars of bacterial cell wall, Role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharide).

Unit 2: Lipids

Definition, classification and functions of lipids. Nomenclature, structure and properties of Fatty acids, saturated and unsaturated fatty acids, essential fatty acids, non-essential fatty acids. Chemical properties and characterization of fats-hydrolysis, Saponification value, Reichert-Meissel number, Iodine number, Acid number, rancidity of fats, General structure and functions of major lipid subclasses, acylglycerol, phosphoglycerides, sphingolipids, terpenes, steroids, eicosanoids.

Unit 3: Proteins

Amino acids: Structure & classification, RS system of designation, properties of amino acids, uncommon amino acids and their important functions, Structure of peptide bond. Organizational levels of protein structure, relationship between primary and higher order structures, supramolecular assemblies of proteins, solubility, denaturation, functional diversity and species specificity of proteins, protein classification, Chemical synthesis of polypeptides. Conformation of proteins: Ramachandran Plot, Secondary, tertiary and quaternary structure; domains; motif and folds.



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(Examination to be held in December ~~2026~~, 2027 & 2028) and 2029

MAJOR COURSE

Course Code: UMJBCHT-302
Course Title: Chemistry of Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

Unit 4: Nucleic Acids

Nucleic acids, composition and importance in living system, types and structure of purine and pyrimidine bases, structure of nucleosides, nucleotides and deoxynucleotides, the binding of nucleotide components, Structure of DNA, Chargaff's rules of DNA composition, features of Watson and Crick model for DNA, Various form of DNA, Structure and roles of different types of RNA, structure of t-RNA, Differences between properties of DNA and RNA, cot curves and cot value, T_m , hypo and hyper-chromicity.

Practicals:

1. Qualitative tests for carbohydrates; Tests for Carbohydrates, Tests for reducing sugars, Tests for Ketose sugar, osazone test, Tests for polysaccharides.
2. Scheme for identification of unknown carbohydrates.
3. Qualitative tests for amino acids; Ninhydrin test, Millon's test, Xanthoproteic test.
4. Qualitative test for proteins; Lowry's test, Biuret test.
5. Methods of precipitation of proteins; by heat Coagulation, by Neutral salts.
6. Qualitative tests for lipids; Solubility test, Litmus test, Saponification, test for unsaturation.
7. Qualitative tests for nucleic acids; Orcinol test, Diphenylamine test.

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Mid Term Assessment test	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Daily Practical Evaluation	-	-	10 (Based on Daily Performance only)
Final Practical Exam	-	-	15 (10 Marks Test & 5 Marks Viva)

A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).

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MAJOR COURSE

Course Code: UMJBCHT-302
Course Title: Chemistry of Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

- b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
- c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Leininger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021)
2. Biochemistry, Voet and Voet, John Wiley & Sons, Inc. 4th Edition (2012).
3. Biochemistry, L. Styrer and et al., W. H. Freeman and company, New York. 9th edition (2019).
4. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
5. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
6. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016)
7. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech. 2nd Edition (2018)
8. Laboratory Manual of Biochemistry & Biotechnology, S. E. H. Rizvi, Mr. Books Fairdeal Shopping Complex Residency Road Srinagar. 1st Edition (2011)



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(Examination to be held in December ~~2026~~, 2027 & 2028) and 2029
MINOR COURSE

Course Code: UMIBCHT-303
Course Title: Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides detailed aspect of Biomolecules. After successful completion of course, the students will be able to understand:

1. The classification, properties of carbohydrates, amino acids, proteins, lipids, cholesterol, DNA, RNA, glycoproteins, glycolipids and their importance in biological systems.
2. Structure of Monosaccharides, Oligosaccharides, Polysaccharides, amino acids.
3. Identify the various biomolecules in the laboratory.
4. Level protein architecture i.e., Primary, Secondary, Tertiary and Quaternary.

Unit 1: Carbohydrates

Definition, importance, detailed classification of carbohydrates, Isomerism in carbohydrates, structure of monosaccharides, Open and Ring structure of Aldoses and Ketoses, Anomeric forms, mutarotation, Reaction of monosaccharides with special reference to glucose, reducing and non-reducing sugars, Oligosaccharides; Classification, Structure and functions of important oligosaccharides; Maltose, Lactose, Sucrose, lactose intolerance, Polysaccharides; classification, Structure and functions of storage and structural polysaccharides, sugars of bacterial cell wall, Role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharide).

Unit 2: Lipids

Definition, importance and functions of lipids. Classification, nomenclature, structure and properties of Fatty acids, Saturated and unsaturated fatty acids, Essential fatty acids, Chemical properties and characterization of fats-hydrolysis, Saponification value, Reichert-Meissel number, Iodine number, Acid number, rancidity of fats, General structure and functions of major lipid subclasses, acylglycerol, phosphoglycerides, sphingolipids, terpenes, steroids, eicosanoids.

Unit 3: Proteins

Amino acids: Structure & classification, RS system of designation, properties of amino acids, uncommon amino acids and their important functions, Structure of peptide bond. Organizational levels of protein structure, relationship between primary and higher order structures, supramolecular assemblies of proteins, solubility, denaturation, functional diversity and species specificity of proteins, protein classification, Chemical synthesis of polypeptides. Conformation of proteins: Ramachandran Plot, Secondary, tertiary and quaternary structure; domains; motif and folds.



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MINOR COURSE

Course Code: UMIBCHT-303
Course Title: Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

Unit 4: Nucleic Acids

Nucleic acids, composition and importance in living system, types and structure of purine and pyrimidine bases, structure of nucleosides, nucleotides and deoxynucleotides, the binding of nucleotide components, Structure of DNA, Chargaff's rules of DNA composition, features of Watson and Crick model for DNA, Various form of DNA, Structure and roles of different types of RNA, structure of t-RNA, Differences between properties of DNA and RNA, cot curves and cot value, T_m , hypo and hyper-chromicity.

Practicals:

1. Qualitative tests for carbohydrates; Tests for Carbohydrates, Tests for reducing sugars, Tests for Ketose sugar, osazone test, Tests for polysaccharides.
2. Scheme for identification of unknown carbohydrates.
3. Qualitative tests for amino acids; Ninhydrin test, Millon's test, Xanthoproteic test.
4. Qualitative test for proteins; Lowry's test, Biuret test.
5. Methods of precipitation of proteins; by heat Coagulation, by Neutral salts.
6. Qualitative tests for lipids; Solubility test, Litmus test, Saponification, test for unsaturation
7. Qualitative tests for nucleic acids; Orcinol test, Diphenylamine test.

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Mid Term Assessment test	50%	1 ½ Hours	15
External Theory End Semester	100%	3 Hours	60
Daily Practical Evaluation	-	-	10 (Based on Daily Performance only)
Final Practical Exam	-	-	15 (10 Marks Test & 5 Marks Viva)

a) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours

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MINOR COURSE

Course Code: UMIBCHT-303
Course Title: Biomolecules
Credits: 4 (3Theory+1Practical)
Total No. of Lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical: 25

b) External End Semester Examination: (60 Marks) Time Allotted 3 Hours

- a) External End Semester Theory Examination will have two sections (A & B).
b) Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
c) Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions selecting one question from each unit. Each question will carry 12 marks.

Suggested Books:

1. Leininger's Principles of Biochemistry, Nelson and Cox, W. H. Freeman and company, New York. 8th Edition (2021).
2. Biochemistry, Voet and Voet, John Wiley & Sons, Inc. 4th Edition (2012).
3. Biochemistry, L. Styrer and et al., W. H. Freeman and company, New York. 9th edition (2019).
4. Fundamentals of Biochemistry, Jain and Jain, S. Chand. 7th edition (2016).
5. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
6. Standard Methods of Biochemical Analysis, S. R. Thimmaiah, Kalyani Publisher. 2nd Edition (2016).
7. Laboratory Manual of Microbiology and Biotechnology, K. R. Aneja, Medtech. 2nd Edition (2018).
8. Laboratory Manual of Biochemistry & Biotechnology, S. E. H. Rizvi, Mr. Books Fairdeal Shopping Complex Residency Road Srinagar 1st Edition (2011).

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Semester – III

(Examination to be held in December ~~2026~~, 2027 & 2028 and 2029)

MULTIDISCIPLINARY COURSE

Course Code: UMDBCHT-304

Course Title: Biochemistry in Health and Disease

Credits: 3

Total No. of Lectures: Theory: 45 hours

Maximum Marks: 75

Theory: 75

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides awareness about Life style diseases and their management. After successful completion of course, the students will:

1. Have knowledge of common lifestyle diseases leading to severe illness.
2. Be able to identify and reflect on current issues and challenges for patients with lifestyle disorders.
3. Be able to interpret results from the serum levels against normal value references.
4. Be aware of the practices that can be followed to prevent the lifestyle diseases and live healthy life.

Unit 1: Concept of Health & Life style Diseases.

Basic concepts in Health Promotion; Health Policy and settings for health promotion, Concept of lifestyle diseases, importance of lifestyle factors in preventing disease development; diet, exercise, smoking, alcohol etc. Planning, Monitoring and Evaluation of Health Promotion programmes.

Unit 2: Cardiovascular Diseases

Atherosclerosis: Characteristics, causes (confirmed & indirect risk factors-brief description only), ischemia, myocardial infarction-definition, Symptoms, Diagnosis (electrocardiography, Exercise ECG–Stress test, Echocardiography, Coronary angiography, Intravascular ultrasound, Magnetic resonance imaging, Prevention (lifestyle, diet, drugs), management (drugs, angioplasty, stent, bypass surgery-brief description only). Hypertension: Characteristics, Causes, Diagnosis, Prevention and Management. Stroke: Characteristics (ischemic and haemorrhagic), Causes, Diagnosis (neurological examination, scanning-brief description only), Management-drugs, Mechanical thrombectomy, Angioplasty and stenting.

Unit 3: Metabolic Disorders

Diabetes mellitus: Classification–Type 1, Type 2, Gestational diabetes, Diabetes insipidus Glucose Tolerance Test, Glycated haemoglobin, symptoms, causes, diagnosis and management of type 2 diabetes, Hypoglycaemia, Glycogen storage diseases, Galactosemia, Lipid storage diseases, Serum Lipid profile, Obesity: classification, symptoms, causes, diagnosis, treatment and management.

Unit 4: Renal and Hepatic Diseases

Nephritis: Function of kidney, Nephritis, Causes, Symptoms, Kidney function test. Management of renal diseases. Liver diseases: Function of liver, Liver disease symptoms, causes, Liver function test, treatment and management.



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(Examination to be held in December ~~2026~~ 2027 & 2028) and 2029
MULTIDISCIPLINARY COURSE

Course Code: UMDBCHT-304
Course Title: Biochemistry in Health and Disease
Credits: 3
Total No. of Lectures: Theory: 45 hours
Maximum Marks: 75
Theory: 75

NOTE FOR PAPER SETTING

Examination Theory / Practical	Syllabus to be covered in the Examination	Time Allotted for Exam	% Weightage (Marks)
Internal Theory Assessment	50%	1½ Hours	15
External Theory End Semester	100%	3 Hours	60

- A) Mid Term Assessment test: (15 Marks) Time Allotted 1 ½ Hours
- B) External End Semester Examination: (60 Marks) Time Allotted 3 Hours
- External End Semester Theory Examination will have two sections (A & B).
 - Section A shall be of 12 Marks and will comprise of 4 short answer type questions one question from each unit carrying 03 Marks each. A candidate will have to attempt all the questions.
 - Section B shall be of 48 Marks and will comprise of 8 long answer type questions, two from each unit. A candidate will have to attempt four questions. Each question will carry 12 marks.

Suggested Books:

- Textbook of Medical Physiology, Guyton and J. E. Hall, Elsevier Saunders, 13th Edition (2015).
- Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P) Ltd. 5th Edition (2020).
- Cell and Molecular Biology Concepts and Experiments, G. Karp, John Wiley & Sons, Inc., 8th Edition, 2015.
- Textbook of Medical Biochemistry, M. N. Chatterjee and R. Shinde, Jaypee Brothers Medical Publishers (P) Ltd., 8th Edition, 2012.
- Textbook of Medical Biochemistry, D.M. Vasudevan, et. al., Jaypee Brothers Medical Publishers (P) Ltd., 9th Edition, 2019.

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SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-311
Course Title: Biochemical Diagnostics
Credits: 3 (25 marks Theory+50 marks Practical)
Total No. of Lectures: Theory: 25 hours
Practical: 30 hours
Maximum Marks: 75
Theory: 25
Practical: 50
Duration of Examination: 2.5 hours

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course also covers the general aspects of diagnosis, and clinical interpretation. After successful completion of course, the students will:

1. Be able to perform measurements of various parameters such as Glucose, cholesterol, electrolytes and enzymes assays.
2. Be able to interpret results of various clinical parameters against normal value references.

THEORY

Unit-1: Diabetics Mellitus and Cardiovascular Diseases

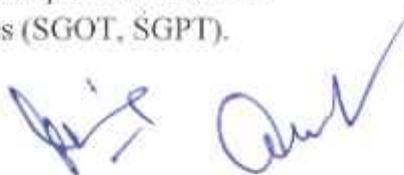
Diabetics Mellitus: Blood glucose estimation by Ortho-Toluidine, Folin Wu & Glucose oxidase method, Glucose Tolerance Test, HbA_{1c}; methodology, reference values & clinical significance. Cardiovascular Diseases: Analysis of Cholesterol (free & total), LDL-cholesterol, HDL-cholesterol, Triglycerides, C-Reactive Proteins (CRP), Sodium and potassium level-methodology, reference values & clinical Significance, Usefulness of enzymes in assessing the myocardial infraction.

Unit-2: Liver and Kidney diseases

Liver function Test: Estimation of Bilirubin (total & conjugated), Serum albumin, serum A/G ratio, Prothrombin time Index (PTI) test, Alanine transaminase (ALT), Aspartate transaminase (AST), Gamma-glutamyl transpeptidase, Lactic dehydrogenase, 5'-nucleotidase and Alpha-fetoprotein - methodology, reference values & clinical Significance Differential diagnosis of hepatitis using above test. Kidney Function test: Estimation of Urea, Creatinine and uric acid-methodology, reference values & clinical Significance. Clearance test-Urea, Creatinine, PAH test.

Practicals:

1. Estimation of blood glucose by Folin Wu method.
2. Estimation of blood glucose by O- Toluidine method.
3. Estimation of serum urea by Diacetyl monoxine method.
4. Estimation of serum creatinine by Jaffe's method.
5. Estimation of serum cholesterol by Zak's method.
6. Estimation of sodium in serum.
7. Estimation of blood Bilirubin (total & conjugate).
8. Estimation of serum Protein.
9. Assay of activity of alkaline phosphatase in serum.
10. Assay of serum Transaminases (SGOT, SGPT).



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SKILL ENHANCEMENT COURSE

Course Code: USEBCHT-311
Course Title: Biochemical Diagnostics
Credits: 3 (25 marks Theory+50 marks Practical)
Total No. of Lectures: Theory: 25 hours
Practical: 30 hours
Maximum Marks: 75
Theory: 25
Practical: 50
Duration of Examination: 2:30 hrs

NOTE FOR PAPER SETTING

Note for paper setting for midterm examination part -1: The question paper will of 25 marks. There will be two sections in the question paper with pattern as follow: Section A shall comprise of 4 short answer type questions of (2.5 Marks each) covering all three units with at least one question from each unit. The students have to attempt all 4 questions from section A. Section B shall be comprise of a total of 6 questions with two questions selected from each unit. Each question shall be of 5 marks. The students have to attempt three questions selecting only one question from each unit. Evaluation of skills: Final examination part 2: The evaluation of skill will be internal. The examination of skill shall be of 50 marks. The evaluation of skill will be done internally through the board of three members (including the trainer of the course).

Suggested Books:

1. Gene Cloning and DNA Analysis: An Introduction- Brown, T. A., Wiley Blackwell, 7th edition (2016).
2. Principles of Gene Manipulations and Genomics- Primrose, S.B and Twyman, R., Black Well Scientific Publications, 8th edition (2016).
3. Elements of Biotechnology- Gupta, P.K., Rastogi and Co., Merrut, India, 3rd edition (2010).
4. RNA and DNA Diagnostics- Erdmann, V.A., Jurga, S. and Barciszewski, J., Springer International Publishing, New York (2015).
5. Molecular Diagnostics- Patrinos, G.P., Danielson, P.B. and Ansorge, W.J., Academic Press Elsevier, 3rd edition (2017).
6. Cellular and Molecular Immunology- Abbas, A., Lichtman, A.H. and Pillai, S., Academic Press Elsevier, 10th edition (2021).
7. Clinical Immunology-Rezaei, M., Academic Press Elsevier (2022).