ABOUT THE DEPARTMENT

Truly keeping in mind, the need of the time, Sourashtra College Council introduced Biochemistry at Undergraduate level in the year 1993. The B.Sc. Biochemistry Programme was started in the Year 1993 with Chemistry and Biology as Ancillary subjects and has produced a number of undergraduates who are well placed in various fields. So far, 29 batches of students have successfully finished their graduation. The Department has a well–equipped library with books and journals of well–known authors and renowned publishing houses. The goal is to provide ample resources on the campus so that they can be supplemented with additional information other than their course work. The library is stocked with more than 1200 books. The Department is committed to give extensive hands– on– experience with modern Instrumentation and Computation which will provide problem solving skills. The Department also focuses on conducting guest lectures, conferences, seminars and workshops by eminent personalities from various fields to brainstorm on various issues and help to expand the students' perspective and knowledge of the working world. The Department conducts Workshops to give hands–on training to the student community from various Colleges. The Department has been conducting annual intercollegiate meet every year to promote awareness and to bring out the

VISION

- To mould the students with good academic record through a three–pronged strategy: effective teaching, quality research, relevant community service.

- To attain academic distinction in biochemistry by providing students with in–depth instruction, supporting research endeavours, and meeting the dynamic demands of industry and society.

MISSION

- To provide students with a high–quality education in biochemistry by utilizing cutting–edge technology.
- To provide a learning environment in which students can improve their problem–solving skills, succeed in their careers, and be prepared to be lifelong learners by providing a solid theoretical and practical foundation in various disciplines of biochemistry and educating them about their professional and ethical responsibilities.

OBJECTIVES

- To succeed in the fields of teaching and research, consequently strengthening the department's position as a center of excellence in research and academics.
- To provide comprehensive holistic understanding by integrating concepts from biochemistry, biotechnology, and bioinformatics and highlighting modern discoveries in life sciences.

GRADUATE ATTRIBUTES

1. **(KB) A knowledge base for Biochemistry**: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized Biochemistry knowledge appropriate to the program.
2. **(PA) Problem analysis**: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex Biochemistry problems in order to reach substantiated conclusions
3. **(Inv.) Investigation**: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
4. **(Des.) Design:** An ability to design solutions for complex, open–ended biochemistry problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. **(Tools) Use of biochemistry tools**: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern biochemistry tools to a range of biochemistry activities, from simple to complex, with an understanding of the associated limitations.
6. **(Team) Individual and teamwork**: An ability to work effectively as a member and leader in teams, preferably in a multi–disciplinary setting.
7. **(Comm.) Communication skills**: An ability to communicate complex biochemistry concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. **(Prof.) Professionalism**: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. **(Impacts) Impact of biochemistry on society and the environment**: An ability to analyze social and environmental aspects of biochemistry activities. Such ability includes an understanding of the interactions that biochemistry has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. **(Ethics) Ethics and equity**: An ability to apply professional ethics, accountability, and equity.
11. **(Econ.) Economics and project management**: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of biochemistry and to understand their limitations.
12. **(LL) Life–long learning**: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B.Sc. Biochemistry Graduates of the Sourashtra College will:

PEO	be equipped with a detailed understanding the molecular events that control growth and development of all living things and thereby enhancing the technical skills to compete and excel in the challenging career aspects.
PEO	have a coherent and systematic approach to the experimental and theoretical aspects of biochemistry. This would also include the student's ability to understand and engage with critical concepts, theories and dogmas.
PEO	understand the role of scientific developments, particularly, biological sciences in a changing world from the disciplinary perspective as well as in relation to its professional and everyday use.
PEO	have a capability to communicate ideas, opinions and values–both scientific themes and values of life in all shades and shapes–in order to expand the knowledge of the subject as it moves from the classroom/laboratory to industry and society.
PEO	have an ability to demonstrate the ability to share the results of academic and disciplinary learning through different forms of communication such as essays, dissertations, reports, findings, notes, seminars etc, on different platforms of communication such as the classroom, the media and the internet.
PEO	recognize the scope of biochemistry in terms of career opportunities, employment and lifelong engagement in teaching, publishing, communication, media, soft skills and other allied fields.

UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

Undergraduate **B.Sc. – Biochemistry** is a 3 – year degree Programme with 6 semesters that consists of the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal / citizenship / ethical credibility, sustainable growth and employable abilities.

PO 1	**Critical Thinking:** Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	**Problem Solving:** Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	**Effective Communication:** Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	**Societal/ Citizenship/ Ethical Credibility:** Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	**Environmental Concern and Sustainable Growth:** Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	**Skill Development and Employable Abilities:** Adequate training in relevant skill sector and creating employable abilities among the under graduates.

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of **B. Sc. Biochemistry Programme**, the students are expected /will be able to:

PSO 1	realize the essential concepts in modern biology to meet the promising trends and inculcating the aptitude to evaluate the various biological mechanisms through diagnostic tools in living cells.
PSO 2	develop practical laboratory skills and strong exploratory foundation in the cross over discipline of Chemistry, Microbiology, Molecular Biology and Bioinformatics by handling microbial, cellular, molecular and biochemical systems.
PSO 3	comprehend the applications of Biochemistry in various fields such as Clinical Biochemistry, Medical Diagnostics, Genetic Engineering, Molecular biology & Biotechnology.
PSO 4	build and instigate innovations effectively and communicate efficiently with the scientific community and society at large to link the gap between scientific industry and academia.
PSO 5	contribute to the betterment of the society by inculcating expertise in healthcare sector by developing the work efficacy as a part of a team and engage effectively in research and development.
PSO 6	develop the ability and willingness to embark on new ventures and initiatives with critical thinking and desire for more continuous learning focusing on technical skills.

DISTRIBUTION OF CREDITS (UG PROGRAMME)

Part	Semester	Courses	No. of. Courses	Hrs.	Credits	Total Credit
I	**I-IV**	Language	**4**	**6**	**3**	**12**
II	**I-IV**	English	**4**	**6**	**3**	**12**
III	**I-VI**	Core	**15**	**4-6**	**4-5**	**69**
	I-VI	Elective and Elective/Allied	**8 + 4**	**3-4**	**3**	**36**
IV	**I-II**	SEC (Non Major Elective)	**2**	**2**	**2**	**4**
	I	Foundation Course FC	**1**	**2**	**2**	**2**
	I-IV	SEC (Discipline Specific/ Generic)	**5**	**2**	**2**	**10**
	IV	EVS(Environmental Studies)	**1**	**2**	**2**	**2**
	V	Value Education	**1**	**2**	**2**	**2**
	V	Internship	**1**	**–**	**2**	**2**
V	**IV**	Extension Activity	**1**	**–**	**1**	**1**
	V	Soft Skills (Self – Study)	**1**	**–**	**1**	**1**
	VI	General Awareness for Competitive Examinations (GK)	**1**	**–**	**1**	**1**
Additional credit will be given to any Online Course taken in SWAYAM Portal						
		Total				**142**

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

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B.Sc. BIOCHEMISTRY

COURSE STRUCTURE – SEMESTER – I

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	25UACT11	I	**Tamil** – பொதுத் தமிழ் – I	6	3	25	75	100	3
	25UACH11		**Hindi** – General Hindi – I						
	25UACS11		**Sanskrit** – Poetry, Grammar and History of Sanskrit Literature						
2	25UACE11	II	**English –** General English – I	6	3	25	75	100	3
3	25UBCC11	III	**Core – 1:** Nutritional Biochemistry	5	3	25	75	100	5
4	25UBCCP1		**Core – 2: Core Practical – I:** Nutritional Biochemistry Practical	5	3	40	60	100	4
5	25UBCA11		**Elective/Allied – 1:** Biochemistry I	4	3	25	75	100	3
6	25UBCN11	IV	**SEC – 1: NME :** Medicinal Diet	2	3	25	75	100	2
7	25UBCFC1		**Foundation Course:** Health and Nutrition	2	3	25	75	100	2
			TOTAL	30					22

SEMESTER – II

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	25UACT21	I	**Tamil** – பொதுத் தமிழ் – II	6	3	25	75	100	3
	25UACH21		**Hindi** – General Hindi – II						
	25UACS21		**Sanskrit**– Prose, Grammar and History of Sanskrit Literature						
2	25UACE21	II	**English** – General English – II	6	3	25	75	100	3
3	25UBCC21	III	**Core – 3:** Cell Biology	5	3	25	75	100	5
4	25UBCCP2		**Core – 4: Core Practical – II**: Cell Biology practical	5	3	40	60	100	4
5	25UBCA21		**Elective/Allied – 2:** Biochemistry – II	4	3	25	75	100	3
6	25UBCN21	IV	**SEC – 2: NME :** Lifestyle Diseases	2	3	25	75	100	2
7	25UBCS21		**SEC – 3: DS :** Microbial Techniques	2	3	25	75	100	2
			TOTAL	30				700	22

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COURSE STRUCTURE – SEMESTER – I

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	25UACT11	I	**Tamil** – பொதுத் தமிழ் – I	6	3	25	75	100	3
	25UACH11		**Hindi** – General Hindi – I						
	25UACS11		**Sanskrit** – Poetry, Grammar and History of Sanskrit Literature						
2	25UACE11	II	**English** – General English – I	6	3	25	75	100	3
3	25UBCC11	III	**Core – 1:** Nutritional Biochemistry	5	3	25	75	100	5
4	25UBCCP1		**Core – 2: Core Practical – I:** Nutritional Biochemistry Practical	5	3	40	60	100	4
5	25UBCA11		**Elective/Allied – 1:** Biochemistry I	4	3	25	75	100	3
6	25UBCN11	IV	**SEC – 1: NME:** Medicinal Diet	2	3	25	75	100	2
7	25UBCFC1		**Foundation Course:** Health and Nutrition	2	3	25	75	100	2
			TOTAL	30					22

CA – Class Assessment (Internal)

SE – Summative Examination

SEC – Skill Enhancement Course

FC –Foundation Course

T – Theory

P – Practical

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCC11	NUTRITIONAL BIOCHEMISTRY	CORE – 1	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course aims to create awareness about the essential role of nutrients in maintaining optimal health. Students will explore the nutritional significance of carbohydrates, lipids, and proteins, and understand their contribution to overall well–being. The importance of a balanced diet will be emphasized, along with the study of food additives, emulsifiers, and flavour– enhancing substances and their impact on health.

COURSE OBJECTIVES:

- To create awareness about the role of nutrients in maintaining proper health
- To make the students understand the nutritional significance of carbohydrates, lipids and proteins and the importance of a balanced diet
- To make them study the effect of additives, emulsifiers, flavour enhancing substances in food and the significance of nutraceuticals

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	cognizance of basic food groups viz. carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value	Upto K3
CO 2	identify and explain nutrients in foods and the specific functions in maintaining health.	Upto K3
CO 3	classify the food groups and its significance	Upto K3
CO 4	understand the effect of food additives	Upto K3
CO 5	describe the importance of nutraceuticals and pigments	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

NUTRITIONAL BIOCHEMISTRY

UNIT – I: **(12 Hrs.)**

Concepts of food and nutrition. Basic food groups– energy yielding, body building and functional foods. Modules of energy. Calorific and nutritive value of foods. Measurement of Calories by bomb calorimeter. Basal metabolic rate (BMR)– definition, determination of BMR and factors affecting BMR. Respiratory quotient (RQ) of nutrients and factors affecting the RQ. SDA– definition and determination– Anthropometric measurement and indices – Height, Weight, chest and waist circumference BMI.

UNIT – II: **(12 Hrs.)**

Physiological role and nutritional significance of carbohydrates, lipids and protein. Evaluation of proteins by nitrogen balance method– Biological value of proteins– Digestibility coefficient, Protein Energy Ratio and Net Protein Utilization. Protein energy malnutrition – Kwashiorkar and Marasmus, Obesity– Types and preventive measures.

UNIT – III: **(12 Hrs.)**

Balanced diet, example of low and high cost balanced diet– for infants, children, adolescents, adults and elderly people. ICMR classification of five food groups and its significance food pyramid. Junk foods– definition and its adverse effects.

UNIT – IV: **(12 Hrs.)**

Food additives: Structure, chemistry, function and application of preservatives, emulsifying agents, buffering agents, stabilizing agents, natural and artificial sweeteners, bleaching, starch modifiers, antimicrobials, food emulsions, fat replacers, viscosity agents, gelling agents and maturing agents. Food colors, flavors, anti– caking agent, antioxidants. Safety assessment of food additives.

UNIT – V: **(12 Hrs.)**

Nutraceuticals and Functional Foods: Definition, properties and function of Nutraceuticals, food Supplements, dietary supplements prebiotics and probiotics, and functional Foods. Food as medicine. Natural pigments from plants– carotenoids, anthocyanins and its benefits.

TEXT BOOKS:

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd– Bredbenner. 2013. Wardlaw's ***Perspectives in Nutrition: A Functional Approach***. McGraw– Hill, Inc., NY, USA.
2. M. Swaminadhan (1995) ***Principles of Nutrition and Dietics***. Bappco.
3. Tom Brody (1998). ***Nutritional Biochemistry*** (2nd ed), Academic press, USA
4. Garrow, J.S, James WPT and Ralph A (2000). ***Human nutrition and dietetics*** (10thed) Churchill Livingstone.
5. Andreas M.Papas (1998). ***Antioxidant Status, Diet, Nutrition, and Health*** (1st ed) CRC

REFERENCE BOOKS:

1. Branen, A.L., Davidson PM & Salminen S. 2001. ***Food Additives***. 2nd Ed. Marcel Dekker.
2. Gerorge, A.B. 1996. ***Encyclopaedia of Food and Color Additives.*** Vol. III. CRC Press.
3. ***Advances in Food Biochemistry,*** FatihYildiz (Editor), CRC Press, Boca Raton, USA, 2010
4. ***Food Biochemistry & Food Processing***, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.
5. Geoffrey Campbell– Platt. 2009. ***Food Science and Technology***. Wiley– Blackwell ,UK.

DIGITAL TOOLS:

- http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf
- https://study.com/academy/lesson/energy– yielding– nutrients– carbohydratesfat– protein.html.
- https://www.nhsinform.scot/healthy– living/food– and– nutrition/eatingwell/vitamins– and– minerals

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**2**	**3**	**2**	**2**
CO3	**3**	**1**	**2**	**3**	**2**	**2**
CO4	**3**	**3**	**2**	**3**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**2**	**2**

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCCP1	NUTRITIONAL BIOCHEMISTRY PRACTICAL	CORE – 2 PRACTICAL	–	5	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship			
	National	✓	Local	✓	Regional	✓	Global			
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	✓	Other Values	

COURSE DESCRIPTION:

This course provides hands– on training in essential biochemical and analytical techniques with a focus on titrimetric methods, biochemical preparation, ash content determination, and lipid extraction.

COURSE OBJECTIVES:

- Impart hands– on training in the estimation of various constituents by titrimetric method
- Prepare Biochemical preparations
- Determine the ash content and extraction of lipid

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	estimate the important biochemical constituents in the food samples.	Upto K3
CO 2	prepare the macronutrients from the rich sources.	Upto K3
CO 3	determine the ash and moisture content of the food samples	Upto K3
CO 4	extract oil from its sources	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

PRACTICAL NUTRITIONAL BIOCHEMISTRY

TITRIMETRY (20 Hrs.)

1. Estimation of ascorbic acid in a citrus fruit.
2. Estimation of calcium in milk.
3. Estimation of glucose by Benedict's method in honey.
4. Estimation of phosphorous (Plant source)

BIOCHEMICAL PREPARATIONS (15 Hrs.)

Preparation of the following substances and its qualitative tests

5. Lecithin from egg yolk.
6. Starch from potato.
7. Casein and Lactalbumin from milk.

GROUP EXPERIMENT (10 Hrs.)

8. Determination of ash content and moisture content in food sample
9. Extraction of lipid by Soxhlet's method.

TEXT BOOKS:

1. ***Laboratory manual in Biochemistry***, J. Jayaraman, 2nd edition, NewAge International Publishers, 2011,
2. ***An Introduction to Practical Biochemistry***, David T. Plummer, 3rd edition, Tata McGraw– Hill Publishing Company Limited, 2001.

REFERENCE BOOKS:

1. ***Biochemical Methods***, Sadasivam S and Manickam A, 4th edition, NewAge International Publishers, 2016
2. ***Essentials of Food and Nutrition***, Vol. I & II, M.S. Swaminathan.
3. Bowman and Robert M. 2006. ***Present Knowledge in Nutrition***.9th edition, International Life Sciences Publishers.
4. Indrani TK. 2003. ***Nursing Manual of Nutrition and Therapeutic Diet,*** 1st edition Jaypee Brothers medical publishers.
5. Martha H. and Marie A. 2012. ***Biochemical, Physiological, and Molecular Aspects of Human Nutrition***.3rd edition. Chand Publishers.

DIGITAL TOOLS:

- https://www.elsevier.com/journals/clinical– biochemistry/0009– 9120/guide– for– authors
- https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
- https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCA11	BIOCHEMISTRY – I	ELECTIVE/ ALLIED – 1	4	–	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

Curriculum Design and Development	Employability			Skill Oriented	✓	Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global			
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability	✓	Human Values	✓	Other Values	

COURSE DESCRIPTION:

This course provides a comprehensive understanding of the fundamental biomolecules essential for life.

COURSE OBJECTIVES:

- Introduce the structure and classification of carbohydrates
- To make the students comprehend the metabolism of carbohydrates
- To make the learn the classification and properties of amino acids
- To elucidate the various levels of organization of Proteins
- To study the functions and deficiency diseases of vitamins

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	classify the structure of carbohydrates and its properties	Upto K3
CO 2	explain the metabolism of carbohydrates and its significance	Upto K3
CO 3	classify amino acids and its properties	Upto K3
CO 4	explain the classification and elucidate the different levels of structural organization of proteins	Upto K3
CO 5	identify the disease caused by the deficiency of vitamins	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

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BIOCHEMISTRY – I

UNIT – I: **(9 Hrs.)**

Definition and classification of carbohydrates, linear and cyclic forms (Haworth projection) for glucose, fructose and mannose and disaccharides (maltose, lactose, sucrose). General properties of monosaccharides and disaccharides. Occurrence and significance of polysaccharides.

UNIT – II: **(9 Hrs.)**

Metabolism– Catabolism and Anabolism. Carbohydrate metabolism– Glycolysis, TCA cycle, HMP shunt and glycogen metabolism and energetics

UNIT – III: **(9 Hrs.)**

Amino acids – Classifications, physical properties – amphoteric nature, isoelectric point and chemical reactions of carboxyl, amino and both groups. Amino acid metabolism– transamination, deamination and decarboxylation.

UNIT – IV: **(9 Hrs.)**

Proteins– classification – biological functions ,physical properties– ampholytes, iso electric point, salting in and salting out, denaturation, nature of peptide bond. Secondary structure, α– helix and β– pleated sheet, tertiary structure, various forces involved– quaternary structure.

UNIT – V: **(9 Hrs.)**

Vitamins– Fat (A,D,E and K) and water soluble vitamins(B complex and C)– sources, RDA, biological functions and deficiency diseases.

TEXT BOOK:

1. Satyanarayan,U (2014) ***Biochemistry*** (4th ed.), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
2. Jain J.L.(2007) ***Fundamentals of Biochemistry***, S.Chand Publishers 311

REFERENCE BOOK:

1. David L.Nelson and Michael M.Cox (2012) ***Lehninger Principles of Biochemistry (6th ed.)*** W.H. Freeman.
2. Voet. D & Voet. J.G (2010) ***Biochemistry, (4th ed.),*** John Wiley & Sons, Inc.
3. Lubert Stryer (2010) ***Biochemistry,(7th ed.***), W.H.Freeman
4. Satyanarayan, U (2014) ***Biochemistry (4th ed.),*** Arunabha Sen Books & Allied (P) Ltd, Kolkata.
5. Jain J.L.(2007) ***Fundamentals of Biochemistry***, S.Chand publishers 31

DIGITAL TOOLS:

- online courses.swayam2.ac.in/cec20_bt12
- 2 online courses.swayam2.ac.in/cec20_bt19

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	2	2	3	2	2
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	2
CO5	3	3	2	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCN11	MEDICINAL DIET	SEC – 1 NME	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship			
	National	✓	Local	✓	Regional	✓	Global			
Curriculum Enrichment	Professional Ethics		Gender	✓	Environment and Sustainability	✓	Human Values	✓	Other Values	

COURSE DESCRIPTION:

This course equips students with foundational knowledge about diet and its role in maintaining health and managing diseases. Students will learn the principles of diet planning and acquire skills in modifying diets to address specific health conditions.

COURSE OBJECTIVES:

- To provide basic knowledge about diet and diet modification for GI diseases
- To plan a diet for liver diseases and prepare diet chart for infectious diseases
- To plan a diet for Diabetes, Renaland Cardio– vascular diseases

COURSE OUTCOMES (COs):

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

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	possess basic knowledge about diet	Upto K3
CO 2	sketch diet plan for gi diseases	Upto K3
CO 3	sketch diet plan for liver diseases	Upto K3
CO 4	sketch a diet plan for infectious diseases	Upto K3
CO 5	prepare diet chart for Diabetes Renaland Cardio–vascular diseases	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

MEDICINAL DIET

UNIT – I:

Principles of Therapeutic Diet: Definitions of Normal diet, Therapeutic diet, soft Diet and Liquid diet. Objectives of Diet Therapy. Advantages of using normal diet as the basis for Therapeutic diet. Normal Diet– therapeutic modification of normal diet.

UNIT – II:

Diet modification in Gastrointestinal diseases: Peptic ulcer, Diarrhea, Lactose intolerance, Constipation and Malabsorption syndrome.

UNIT – III:

Diet Modification in liver and gall bladder in diseases: Etiology, symptoms and dietary treatment in jaundice, hepatitis, cirrhosis of liver and hepatic coma.

UNIT – IV:

Diet Modification in Infectious Diseases: Fevers, Typhoid, Tuberculosis and Viral Hepatitis. Dietary modifications in Tuberculosis.

UNIT – V:

Diet Modification in Diabetes, Renaland Cardio– vascular diseases– Diabetes, acute & chronic glomerulonephritis, nephrosis, renal failure, kidney stone and Hypertension.

TEXT BOOKS:

1. M.RaheenaBegum , ***A Text Book of Foods, Nutrition and Dietetics,*** Sterling Publishers Pvt.Ltd.
2. M.V.RajaGopal ,Sumati.R.,Mudambi, ***Fundamentals of foods and Nutrition,*** Wiley Eastern Limited, Year– 1990.
3. William S.R ***Nutrition and Diet Therapy,*** 1985, 5th edition, Mosly Co.St.Louis.

REFERENCE BOOKS:

1. Rodwell Williams ***Nutrition and Diet Therapy***, 1985, C.V Mosly St. Louis.
2. M.V. Krause & M.A. Mohan, ***Food Nutrition and Diet Therapy,*** 1992 by W.B Saunders Company, Philadelphia, London.
3. Davidson and Passmore, ***Human Methods and Diabetics,*** 1976 the English Language Book Society and Churchill.

DIGITAL TOOLS:

- https://openoregon.pressbooks.pub/nutritionscience/chapter/3d– disorders– of– gi– tract/
- https://www.mayoclinic.org/diseases– conditions/diabetic nephropathy/symptoms– causes/syc– 20354556
- https://www.truemeds.in/blog/what– food– you– should– eat– and– avoid– in– tuberculosis

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	2	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. BIOCHEMISTRY – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2025 – 2026 onwards)

453

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCFC1	HEALTH AND NUTRITION	FOUNDATION COURSE	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability	✓	Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course provides a foundational understanding of health and nutrition, focusing on the essential nutrients that support human well– being.

COURSE OBJECTIVES:

To

- give basic knowledge about health and vitamins.
- teach about functions of fat on health.
- teach the types of minerals and its functions
- teach about the importance of carbohydrates and proteins on health

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	understand about the importance of health and diet	Upto K3
CO 2	discuss about the classification properties and deficiencies of vitamins	Upto K3
CO 3	understand about sources and functions of fats and lipids on health	Upto K3
CO 4	detail about the different typed of minerals and its role in health	Upto K3
CO 5	relate the role of proteins and carbohydrates on health	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

HEALTH AND NUTRITION

UNIT – I: **(6 Hrs.)**

Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet and calorific value.

UNIT – II: **(6 Hrs.)**

Vitamins– definition, classification, sources, properties, functions and deficiency symptoms.Recommendeddailyallowances.

UNIT – III: **(6 Hrs.)**

Sources and functions of dietary fats, role of fats in health and diseases.

UNIT – IV: **(6 Hrs.)**

Minerals– Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus, Potassium, Copper, Iron, Zinc and Selenium. Minerals in biological systems and their importance –Iron, Calcium, Phosphorus, Iodine, Copper, Zinc.

UNIT – V: **(6 Hrs.)**

Role of proteins and carbohydrates in health. Functions of protein and carbohydrate and their calorific value. Dietary sources and deficiency disorders – Kwashiorkor and Marasmus – supplementation programs in India and their implications.

TEXT BOOKS:

1. S.Davidson and J.R.Passmore (1986) ***Human Nutrition and Dietetics, (8th ed.),*** Churchill Livingstone
2. J. S. Garrow, W. Philip T. James, A. Ralph (2000), ***Human Nutrition and Dietetics* (*10th ed.),*** Churchill Livingstone
3. M.Swaminathan (1995) ***Principles of Nutrition and Dietetics***, Bappco

REFERENCE BOOK:

Margaret Mc Williams (2012). ***Food Fundamentals (10th ed.),*** Prentice Hall

DIGITAL TOOLS:

- https://www.universalclass.com/articles/health/nutrition/nutritional– needs– for– differentages.
- www.anme.com.mx/libros/PrinciplesofNutrition.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	2	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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COURSE STRUCTURE – II SEMESTER

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	25UACT21	I	**Tamil** – பொதுத் தமிழ் – II	6	3	25	75	100	3
	25UACH21		**Hindi** – General Hindi – II						
	25UACS21		**Sanskrit**– Prose, Grammar and History of Sanskrit Literature						
2	25UACE21	II	**English** – General English – II	6	3	25	75	100	3
3	25UBCC21	III	**Core – 3:** Cell Biology	5	3	25	75	100	5
4	25UBCCP2		**Core – 4: Core Practical – II**: Cell Biology practical	5	3	40	60	100	4
5	25UBCA21		**Elective/Allied – 2:** Biochemistry – II	4	3	25	75	100	3
6	25UBCN21	IV	**SEC – 2: NME:** Lifestyle Diseases	2	3	25	75	100	2
7	25UBCS21		**SEC – 3: DS :** Microbial Techniques	2	3	25	75	100	2
			TOTAL	30				700	22

CA – Class Assessment (Internal)

SE – Summative Examination

SEC – Skill Enhancement Course

DS – Discipline Specific

NME – Non –Major Elective

T – Theory

P – Practical

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

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456

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCC21	CELL BIOLOGY	CORE – 3	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

Curriculum Design and Development	Employability			Skill Oriented	✓	Entrepreneurship					
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability	✓	Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course provides a foundational understanding of cellular architecture and its organelles, emphasizing the structural and functional differences between prokaryotic and eukaryotic organisms. The course covers key aspects of the cell cycle, cell division, and the basic principles governing cellular processes.

COURSE OBJECTIVES:

- To provide basic understanding of architecture of cells and its organelles
- To make the students understand the organization of prokaryotic and eukaryotic genome
- To educate on the structural organization of bio membrane and transport mechanism
- To impart knowledge on cell cycle, cell division and basics of cells
- To familiarize the concept of mechanism of cell– cell interactions

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	explain the structure and functions of basic components of prokaryotic and eukaryotic cells, especially the organelles.	Upto K3
CO 2	be familiar with the cytoskeleton and chromatin	Upto K3
CO 3	illustrate the structure, composition and functions of cell membrane related to membrane transport	Upto K3
CO 4	elaborate the phases of cell cycle and cell division– mitosis and meiosis and characteristics of cancer cells.	Upto K3
CO 5	relate the structure and biological role of extracellular matrix in cellular interactions	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

CELL BIOLOGY

UNIT – I: **(12 Hrs.)**

Architecture of cells– Structural organization of prokaryotic and eukaryotic cells microbial, plant and animal cells. The ultrastructure of nucleus, mitochondria, RER, SER, golgi apparatus, lysosome, peroxisome and their functions.

UNIT – II: **(12 Hrs.)**

Cytoskeleton– microfilament, microtubules and intermediary filament– structure, composition and functions. Organization of Genome – prokaryotic, and eukaryotic genome. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure. Special types of chromosomes – lamp brush chromosomes, polytene chromosomes.

UNIT – III: **(12 Hrs.)**

Biomembranes– Structural organization of bilipid layer model and basic functions– transport across cell membranes– uniport, symport and antiport. Passive and active transport.

UNIT – IV: **(12 Hrs.)**

Cellcycle– Definition and Phases of Cellcycle– Cell division– Mitosis and Meiosis and its significance, Casncer cells– definition, types and characteristics of cancer cells.

UNIT – V: **(12 Hrs.)**

Extracellular matrix – Collagen, laminin, fibronectin and proteoglycans– structure and biological role. Structure and role of cadherin, selectins, integrins, Cell – cell interactions– Types– gap junctions, tight junctions and Desmosomes.

TEXT BOOKS:

1. Arumugam. N, ***Cell Biology***. Saras publication(10th ed , paperback), 2019
2. Devasena. T. ***Cell Biology***. Oxford University Press India– ISBN:9780198075516, 0198075510, 2012
3. Bruce Alberts and Dennis Bray. 2013, ***Essential Cell Biology***. (4th ed). Garland Science.

REFERENCE BOOKS:

1. S.C.R. ***Cell Biology***. Newage Publishers – ISBN– 10: 8122416888/ISBN– 13: 978– 8122416886, 2008
2. Cooper, G.A. The Cell: ***A Molecular Approach***. Sinauer Associates, Inc – ISBN10: 0878931066 / ISBN 13: 9780878931064, 2013
3. E.M.F., D.R, Cell and ***Molecular Biology***. Lippincott Williams & Wilkins Philadelphia – ISBN: 0781734932 9780781734936, 2006
4. Lodish, H.A, Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. 2007. ***Molecular Cell Biology***, 6th Edition, WH. Freeman Publishers, New York, USA.

DIGITAL TOOLS:

- https://nicholls.edu/biol– ds/bio1155/Lectures/Cell%20Biology.pdf
- https://www.medicalnewstoday.com/article/320878.php
- https://biologydictionary.net /cell

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	2	2	3	2	2
CO3	3	2	2	3	2	2
CO4	3	3	2	3	2	2
CO5	3	2	2	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCCP2	CELL BIOLOGY PRACTICAL	CORE – 4	–	5	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

Curriculum Design and Development	Employability			Skill Oriented	✓		Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics		Gender	✓	Environment and Sustainability	✓	Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course offers a comprehensive introduction to the principles and applications of microscopy in the study of cells. Emphasis will be placed on imaging cells using various staining techniques to enhance visualization. The course includes the identification of cellular structures, organelles, and stages of cell division, as well as the recognition of biological spotters.

COURSE OBJECTIVES:

- Teach the parts of microscope
- Investigate the cells under microscope.
- Image the cells using different stains
- Identify the cells, organelles and stages of cell division
- Identify the spotters

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	identify the parts of microscope.	Upto K3
CO 2	preparation of slides	Upto K3
CO 3	identify the stages of mitosis & meiosis	Upto K3
CO 4	visualize nucleus and mitochondria by staining methods	Upto K3
CO 5	identify the spotters of cells, organelles and stages of cell division	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

PRACTICAL CELL BIOLOGY

I. MICROSCOPY AND STAINING TECHNIQUES

1. Study the parts of light and compound microscope
2. Preparation of Slides and Micrometry
3. Examination of prokaryotic and eukaryotic cell
4. Visualization of animal and plant cell by methylene blue
5. Visualization of nuclear fraction by acetocarmine stain
6. Staining and visualization of mitochondria by Janus green stain

II. GROUP EXPERIMENT

7. Identification of different stages of mitosis in onion root tip
8. Identification of different stages of meiosis in onion bulb

III. SPOTTERS

9. a) Cells: Nerve, plant and Animal cell
   b) Organelles: Mitochondria, Chloroplast, Endoplasmic reticulum,
   c) Mitosis stages–Prophase, Anaphase, Metaphase, Telophase

TEXT BOOKS:

1. Rickwood, D and J.R. Harris ***cell Biology: Essential Techniques***, John wikey1996.
2. Davis, J.M. ***Basic Cell culture: A practical approach***, IRL 1994.
3. Ganesh M.K. and Shivashankara A.R. 2012. ***Laboratory Manual for Practical Biochemistry*** Jaypee publications, 2nd Edn.

REFERENCE BOOKS:

1. ***Essential practical handbook of Cell biology ,Genetics and Microbiology – A Practical manual***– Debarati Das Academic publishers, ISBN, 9789383420599, 1st Edition 2017
2. ***Cell biology Practical***, Dr.Venugupta ISBN8193651219, Prestige publisher, 1st Jan 2018.
3. ***Cell and Molecular biology,*** De Robertis, 8th edition, 1st June, 1987

DIGITAL TOOLS:

- http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
- https://www.microscopemaster.com/organelles.html
- https://www.pdfdrive.com/biochemistry– books.htm
- http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles.
- http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
- https://www.khanacademy.org/science/ap– biology/heredity/meiosis– and– geneticdiversity/a/phases– of– meiosis
- https://www.microscopemaster.com/organelles.html
- https://www.pdfdrive.com/biochemistry– books.html

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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B.Sc. BIOCHEMISTRY – SYLLABUS

(Under CBCS based on OBE)

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCA21	BIOCHEMISTRY – II	ELECTIVE/ ALLIED – 2	4	–	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics		Gender	✓	Environment and Sustainability		Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course provides an in– depth understanding of key biomolecules and their biological significance. students will develop a comprehensive understanding of these biomolecules and their interconnected roles in health and disease.

COURSE OBJECTIVES:

- Impart knowledge on the classification, properties and characterization of lipids.
- Comprehend the metabolism of Lipids
- Acquaint with the structure, properties and functions of nucleic acids
- Learn about the enzyme kinetics and inhibition
- Study the importance of Hormones

COURSE OUTCOMES (COs):

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

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	elaborate on classification, structure, properties, functions and characterization of lipids	Upto K3
CO 2	discuss the metabolism of lipids and its importance	Upto K3
CO 3	explain about structure, properties and functions of nucleic acids	Upto K3
CO 4	derive Michaelis Menten equation and concepts of enzyme inhibition	Upto K3
CO 5	classify the Hormones and its biological functions	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

BIOCHEMISTRY – II

UNIT – I: **(9 Hrs.)**

Lipids–Bloor's classification of lipids– simple lipids, fatty acids (saturated and unsaturated), compound lipids, derived lipids. Properties of lipids– reduction, oxidation, halogenation, saponification and rancidity .Classification and functions of phospholipids, Cholesterol – structure and biological importance.

UNIT – II: **(9 Hrs.)**

Lipid metabolism– Oxidation of fatty acids(Palmitic acid) – Beta oxidation– Role of carnitine, energetics , alpha oxidation and omega oxidation. Biosynthesis of saturated fatty acids.

UNIT – III: **(9 Hrs.)**

Purine and pyrimidine bases, nucleosides, nucleotides, polynucleotides, DNA structure, various types, properties– absorbance, effect of temperature. Different types of RNA, structure and function, Genetic code.

UNIT – IV: **(9 Hrs.)**

Enzymes – Nomenclature, IUB system of enzyme classification, active site, specificity, isoenzymes, units of enzyme activity factors affecting enzyme activity– substrate concentration, pH, temperature. Enzyme Kinetics– Michaelis and Menten equation. Line weaver– Burk plot. Enzyme inhibition, competitive, uncompetitive and andnon competitive inhibition.

UNIT – V: **(12 Hrs.)**

Hormones – classification, Biological functions of Insulin, Thyroid and Reproductive hormones .

TEXT BOOKS:

1. Satyanarayan,U (2014) ***Biochemistry (4th ed),*** Arunabha Sen Books & Allied (P) Ltd, Kolkata.
2. Jain J.L.(2007) ***Fundamentals of Biochemistry***,S.Chand publishers

REFERENCE BOOKS:

1. David L.Nelson and Michael M.Cox (2012) ***Lehninger Principles of Biochemistry (6th ed)*** W.H. Freeman.
3. Voet.D & Voet. J.G (2010) ***Biochemistry , (4th ed),*** John Wiley & Sons, Inc.
4. Lubert Stryer (2010) ***Biochemistry,(7th ed),*** W.H.Freeman

DIGITAL TOOLS:

- onlinecourses.swayam2.ac.in/cec20_bt12
- onlinecourses.swayam2.ac.in/cec20_bt19

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	2	2	3	2	2
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	3	2	3	2	2

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463

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCN21	LIFESTYLE DISEASES	SEC – 2 NME	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship				
	National	✓	Local	✓	Regional	✓	Global				
Curriculum Enrichment	Professional Ethics	✓	Gender	✓	Environment and Sustainability		Human Values	✓	Other Values		

COURSE DESCRIPTION:

This course aims to create awareness about lifestyle diseases, with a particular focus on adolescents and their unique health challenges.

COURSE OBJECTIVE:

- Create awareness on lifestyle diseases among adolescents.
- List out the lifestyle diseases.
- Explain the common lifestyle diseases and their prevention.
- Acquaint the disorders associated with women's health.
- Impart life skills so as to prevent lifestyle diseases.

COURSE OUTCOMES (CO):

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	demonstrate the fermentation process	Upto K3
CO 2	correlate the role of plant hormones in plant tissue culture	Upto K3
CO 3	apply various techniques to isolate microbes	Upto K3
CO 4	solve the problem associated with genetic disorders	Upto K3
CO 5	elaborate principle behind the transgenesis	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

LIFESTYLE DISEASES

UNIT – I: **(6 Hrs.)**

Lifestyle diseases: Definition, Factors contributing to lifestyle diseases – Physical inactivity, Poor food habits, disturbed biological clock, sleep deprivation.

UNIT – II: **(6 Hrs.)**

Top lifestyle diseases, Impact of Lifestyle diseases on family, society and economy of country.

UNIT – III: **(6 Hrs.)**

Causes, symptoms**,** types, preventive measures and treatment of Obesity, cardiovascular diseases, diabetes and cancer.

UNIT – IV: **(6 Hrs.)**

Women's lifestyle diseases: Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis.

UNIT – V: **(6 Hrs.)**

Prevention of lifestyle diseases: Balanced diet, sufficient intake of water, physical activity, sleep– wake cycle, stress management and meditation.

TEXT BOOKS:

1. James M R, ***Lifestyle Medicine,2nd Edition,***CRC Press,2013
2. Akira Miyazaki, ***New Frontiers in Lifestyle– Related Disease***, Springer, 2008

REFERENCE BOOKS:

1. Steyn K, ***Lifestyle and Related Risk Factors for Chronic Diseases***
2. Willett WC, ***Prevention of Chronic Disease by Means of Diet and Lifestyle***.
3. Kumar M & R. Kumar, ***Guide to Prevention of Llifestyle Diseases***. Deep & Deep publications

DIGITAL TOOLS:

- https://youtu.be/jDdL2bMQXfE
- https://youtu.be/7WnpSB14nDM
- https://youtu.be/ollz9MqtW– U

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	2	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	2	2

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
25UBCS21	MICROBIAL TECHNIQUES	SEC – 3 DS	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented	✓	Entrepreneurship					
	National	✓	Local	✓	Regional	✓	Global			✓
Curriculum Enrichment	Professional Ethics	✓	Gender		Environment and Sustainability	✓	Human Values	✓	Other Values	

COURSE DESCRIPTION:

This course provides a comprehensive introduction to microbiology with a focus on studying bacterial growth, microscopy techniques, microbial identification, and food preservation methods.

COURSE OBJECTIVES:

- Study the growth of bacteria
- Know the parts & uses of microscope
- Learn staining methods to identify microbes
- Learn different types of culture methods
- Study food preservation methods

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level
CO 1	understand the growth of bacteria and to perform cell count	Upto K3
CO 2	acquire knowledge of microscope and its uses	Upto K3
CO 3	identify the microbes by staining methods	Upto K3
CO 4	culture microbes by various methods	Upto K3
CO 5	preserve foods at high and low temperature	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING

MICROBIAL TECHNIQUES

UNIT – I: **(6 Hrs.)**

Growth of bacteria– Definition, growth phases, factors affecting growth (pH, temperature, and oxygen), cell count (hemocytometer, Bacterial cell– Bacillus subtilis), fungal cell (Saccharomyces) and human blood cell.

UNIT – II: **(6 Hrs.)**

Microscopy– Principle, types – Compound microscope, electron microscope– TEM, SEM, use of oil immersion objective.

UNIT – III: **(6 Hrs.)**

Stains and staining– Principles of staining, simple staining, negative staining, Differential staining, Gram and acid– fast staining, flagella staining, capsule and endospore Staining. Staining of yeast (methylene blue), lactophenol cotton blue, staining of mold (Penicillium, Aspergillus), Agaricus.

UNIT – IV: **(6 Hrs.)**

Cultivation of bacteria– Types of growth media (natural, synthetic, complex, enriched, selective– definition with example), culture methods (streak plate, spread plate, pour plate, stab culture, slant culture, liquid shake culture, anaerobiosis) – aerobic and Anaerobic bacteria.

UNIT – V: **(6 Hrs.)**

Food microbiology– Microbiological examination of food: microscopic examination and culture, phosphatase test of Pasteurized milk. Preservation of food– High temperature (boiling, pasteurization, appreciation), low temperature (freezing), dehydration, osmotic pressure, chemical preservations, radiation. Microorganisms as food SCP.

TEXT BOOKS:

1. ***Sherris Medical Microbiology***, 7th Edition byAuthors: Kenneth Ryan, C. George Ray, Nafees Ahmad, W. Lawrence Drew, Michael Lagunoff, Paul Pottinger, L. Barth Reller and Charles R. Sterling
2. ***Food Microbiology: Fundamentals And Frontiers***, 5th Edition by Editor(s):Michael P. Doyle, Francisco Diez– Gonzalez, Colin Hill
3. ***Text book of Microbiology*** by Ananthanarayan and Panicker's
4. ***Textbook of Microbiology*** by P.C. Trivedi Sonali Pandey Seema Bhadauria
5. ***Prescott's Microbiology***, 10th Edition by Authors: Joanne Willey, Linda Sherwood and Christopher J. Woolverton

REFERENCE BOOKS:

1. Bailey & Scott's ***Diagnostic Microbiology***, 14th Edition by Author: Patricia Title
2. ***Medical Microbiology***, 7th Edition Authors: Patrick R. Murray, Ken S. Rosenthal and Michael A. Pfaller.
3. ***National Academies of Sciences, Engineering, and Medicine***. 2015. Support for Forensic

DIGITAL TOOLS:

- https://www.ncjrs.gov/pdffiles1/nij/sl000957.pdf
- https://www.sussex.ac.uk/webteam/gateway/file.php?name=sewp161.pdf&site
- http://nist.gov/forensics/center– excellence– forensic052615.cfm
- http://www.justice.gov/sites/default/files/ncfs/legacy/2014/05/13/ncfs– charter.pdf

Mapping of CO with PSO

.	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	3
CO5	3	3	3	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level