



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. BIOCHEMISTRY – SYLLABUS

(Under CBCS based on OBE)(For those admitted during 2024 – 2025 and after)

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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 hidden talent among the students.

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 endeavors, 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.



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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 1	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 2	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 3	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 4	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 5	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 6	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 (B.Sc. BIOCHEMISTRY)

Part	Sem	Courses	No. of Courses	Hours	Credits	Total Credits
I	I-IV	LANGUAGE	4	6	3	12
II	I-IV	ENGLISH	4	6	3	12
III	I-VI	CORE	15	4-5	4	60
III	I-IV	ALLIED	6	4	4	24
III	V-VI	ELECTIVE	3	5	5	15
IV	I-IV	SKILL BASED SUBJECT	6	2	2	12
IV	I	VALUE EDUCATION	1	2	2	2
IV	I	ENVIRONMENTAL STUDIES	1	2	2	2
IV	III, IV	NON MAJOR ELECTIVE	2	2	2	4
V	IV	EXTENSION ACTIVITY	1	0	1	1
	V	SELF – STUDY (SOFT SKILLS)	1	0	0	0
	VI	SELF –STUDY (G.K. (ONLINE))	1	0	0	0
TOTAL						144
Any online courses in SWAYAM PORTAL						



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B.Sc. BIOCHEMISTRY – COURSE STRUCTURE

SEMESTER – I

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT11	Part – I: Tamil – பொதுத் தமிழ் – I	6	3	25	75	100	3
	24UACH11	Hindi – General Hindi – I						
	24UACS11	Sanskrit – Poetry, Grammar and History of Sanskrit Literature						
2	24UACE11	Part – II: English – General English – I	6	3	25	75	100	3
3	24UBCC11	Part – III: Core – 1: Biomolecules	5	3	25	75	100	4
4	24UBCCP1	Part – III: Core Practical – I*: Lab in Biomolecule analysis	3	–	–	–	–	0
5	24UBCA11	Part – III: Allied – 1: General Chemistry	4	3	25	75	100	4
6	24UBCAP1	Part – III: Allied Practical – I*: Volumetric Analysis	2	–	–	–	–	–
7	24UBCS11	Part – IV: SBS – 1: Nutritional Biochemistry	2	3	25	75	100	2
8	24UACVE1	Part – IV: Value Education	2	3	25	75	100	2
TOTAL			30				600	18

*Practical examination conducted at the end of the even semester

SEMESTER – II

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT21	Part – I: Tamil – பொதுத் தமிழ் – II	6	3	25	75	100	3
	24UACH21	Hindi – General Hindi – II						
	24UACS21	Sanskrit – Prose, Grammar and History of Sanskrit Literature						
2	24UACE21	Part – II: English – General English – II	6	3	25	75	100	3
3	24UBCC21	Part – III: Core – 2: Biochemical Techniques	5	3	25	75	100	4
4	24UBCCP1	Part – III: Core Practical - I: Lab in Biomolecule analysis	3	3	40	60	100	4
5	24UBCA21	Part – III: Allied – 2: Allied Chemistry for Life Sciences	4	3	25	75	100	4
6	24UBCAP1	Part – III: Allied Practical - I: Volumetric Analysis	2	3	40	60	100	4
7	24UBCS21	Part – IV: SBS – 2: Pharmacology	2	3	25	75	100	2
8	24UACES2	Part – IV: Environmental Studies	2	3	25	75	100	2
TOTAL			30				800	26

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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SEMESTER – III

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1		Part – I: Tamil – காப்பியமும் நாடகமும்	6	3	25	75	100	3
		Hindi – Hindi – III						
		Sanskrit – Sanskrit – III						
2		Part – II: English – English For Enrichment – III	6	3	25	75	100	3
3		Part – III: Core – 3: Enzymology and Enzyme Technology	5	3	25	75	100	4
4		Part – III: Core Practical – II*: Lab in Biochemical Analysis	3	–	–	–	–	–
5		Part – III: Allied – 3: Cell Biology and Genetics	4	3	25	75	100	4
6		Part – III: Allied Practical - II*: Lab in Cell Biology and Genetics & Biodiversity and Conservation	2	–	–	–	–	–
7		Part – IV: SBS –3: Medical Lab Technology	2	3	25	75	100	2
8		Part – IV: NME – 1: Health and Human Diseases	2	3	25	75	100	2
		TOTAL	30				600	18

*Practical examinations at the end of the IV semester

SEMESTER – IV

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	C A	SE	Total Marks	Credits
1		Part – I: Tamil – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
		Hindi – Hindi – IV						
		Sanskrit – Sanskrit – IV						
2		Part – II: English For Enrichment – IV	6	3	25	75	100	3
3		Part – III: Core – 4: Metabolism	5	3	25	75	100	4
4		Part – III: Core Practical – II*: Lab in Biochemical Analysis	3	3	40	60	100	4
5		Part – III: Allied - 4: Biodiversity and Conservation	4	3	25	75	100	4
6		Part – III: Allied Practical - II*: Lab in Cell Biology and Genetics & Biodiversity and Conservation	2	3	40	60	100	4
7		Part – IV: SBS – 4: Biostatistics	2	3	25	75	100	2
8		Part – IV: NME – 2: Herbal Medicine	2	3	25	75	100	2
9		Part – V: Extension Activities	–	–	–	–	100	1
		TOTAL	30				900	27

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SEMESTER – V

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1		Part – III: Core – 5: Molecular Biology	4	3	25	75	100	4
2		Part – III: Core – 6: General Microbiology	4	3	25	75	100	4
3		Part – III: Core – 7: Immunology and Immunotechnology	4	3	25	75	100	4
4		Part – III Core Practical – III: Lab in Microbiology and Immunology	4	3	40	60	100	4
5	Part – III : Elective – 1:		4	3	25	75	100	5
		Medical Diagnostics						
		Human Physiology						
		Ecology and Environmental Toxicology						
6	Part – III: Elective – 2:		4	3	25	75	100	5
		Bioinformatics						
		Structural Biology						
		Pharmaceutical Biochemistry						
7		Part – IV: SBS – 5: Hospital Management	2	3	25	75	100	2
8		Soft Skills(Self–Study)	–	–	–	–	100	0
		TOTAL	30				800	28

*One elective course to be chosen from THREE courses



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SEMESTER – VI

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1		Part – III: Core – 8: Biotechnology & Genetic Engineering	5	3	25	75	100	4
2		Part – III: Core – 9: Plant Biochemistry	5	3	25	75	100	4
3		Part – III: Core – 10: Clinical Biochemistry	4	3	25	75	100	4
4		Part – III; Core – 11: Food Processing Technology	4	3	25	75	100	4
5		Part – III: Core Practical – IV: Lab in Clinical Biochemistry	5	3	40	60	100	4
6		Part – III: Elective – 3:	5	3	25	75	100	5
		Endocrinology and Hormonal Regulations						
		Industrial Biochemistry						
		Therapeutic Nutrition						
7		Part – IV: SBS – 6: Bio-entrepreneurship	2	3	25	75	100	2
8		General Knowledge (Self-Study)	–	–	–	–	100	0
		TOTAL	30				800	27

*One elective course to be chosen from THREE courses



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COURSE STRUCTURE – SEMESTER I

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24UACT11	Part – I: Tamil – பொதுத் தமிழ் – I	6	3	25	75	100	3
	24UACH11	Hindi – General Hindi – I						
	24UACS11	Sanskrit – Poetry, Grammar and History of Sanskrit Literature						
2	24UACE11	Part – II: English – General English – I	6	3	25	75	100	3
3	24UBCC11	Part – III: Core – 1: Biomolecules	5	3	25	75	100	4
4	24UBCCP1	Part – III: Core Practical – I*: Lab in Biomolecule analysis	3	–	–	–	–	0
5	24UBCA11	Part – III: Allied – 1: General Chemistry	4	3	25	75	100	4
6	24UBCAP1	Part – III: Allied Practical – I*: Volumetric Analysis	2	–	–	–	–	–
7	24UBCS11	Part – IV: SBS – 1: Nutritional Biochemistry	2	3	25	75	100	2
8	24UACVE1	Part – IV: Value Education	2	3	25	75	100	2
		TOTAL	30				600	18

* Practical examination conducted at the end of the even semester

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCC11	BIOMOLECULES	CORE – 1	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

An introduction to the structures, general properties, and functions of simple and complex biomolecules: carbohydrates, amino acids, proteins, lipids, nucleic acids and vitamins.

COURSE OBJECTIVES:

- To understand the structure and functions of Biomolecules such as Carbohydrates, Proteins, Aminoacids, Lipids, and Vitamins.
- To know the biological importance of various biomolecules.
- To know about the physiological importance of biomolecules in the human system.
- To comprehend the occurrence, physical and chemical properties of biomolecules.

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	comprehend the vital knowledge on the biological significance of carbohydrates and their Structure.	Upto K3
CO 2	realize the occurrence, classification, physical and chemical properties of lipids.	Upto K3
CO 3	recognize the relationship between the structure and functions of proteins in biological context.	Upto K3
CO 4	discern the structural properties and biological prominence of nucleic acids.	Upto K3
CO 5	recognize the physiological significance of vitamins.	Upto K3

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



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BIOMOLECULES

UNIT – I:

Introduction, sources, classification into mono, oligo and polysaccharides. Classification of monosaccharides, based on no. of C-atoms. Functional groups– aldoses and ketoses. Isomerism of Carbohydrates, Fischer projections, Haworth structures, pyranose and furanose structures, Anomers. Structure and properties of oligosaccharides and polysaccharides.

UNIT – II:

Lipids – structure, classification, types – simple, compound and derived lipids, physical and chemical properties, biological importance of lipids.

UNIT – III:

Amino acids and Proteins–Introduction, definition and classification– physical and chemical properties, structure of proteins– primary, secondary, tertiary and quaternary structures, Forces involved in stabilization of protein structure. Ramachandran plot. Folding of proteins. biological functions of proteins.

UNIT – IV:

Nucleic acids – Purine and Pyrimidines – structure and properties. Nucleosides. Nucleotides. DNA and RNA. Composition, structure, their biological importance, Comparison between DNA and RNA, Denaturation and Renaturation of nucleic acid .

UNIT – V:

Vitamins – An introduction, Brief mention of source and physiological role of Fat soluble vitamins–Vitamin A, D, E, and K. Brief mention of source and physiological role of Water soluble vitamins–Vitamin B complex, Vitamin C.

TEXT BOOKS:

1. Jain J.L..(2008). *Fundamentals of Biochemistry*. New Delhi: Multicolour illustrative edition, S.Chand.& Company LTD. Ram Nagar.
2. Satyanarayan,U (2014) *Biochemistry* (4th ed), ArunabhaSen Books & Allied (P) Ltd, Kolkata.

REFERENCE BOOKS:

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. Metzler D.E (2003). *The Chemical Reactions of Living Cells* (2nd ed), Academic Press.
4. Zubay G.L (1999) *Biochemistry*, (4th edition), Mc Graw–Hill.
5. LubertStryer (2010) *Biochemistry*, (7th edition), W.H. Freeman

DIGITAL TOOLS:

- <https://www.nios.ac.in/media/documents/313courseE/L31.pdf>
- <https://www.biotechnika.org/2023/03/csir-net-biomolecules-notes-carbohydrate-lipids-pdf-download/>
- <https://www.geeksforgeeks.org/biomolecules-definition-structure-classification-examples/>
- <http://mrmitchellsbiology.weebly.com/biomolecules-notes.html>

Mapping of CO with PSO

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

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCCP1	LAB IN BIOMOLECULE ANALYSIS	CORE PRACTICAL	-	3	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	-	-	-

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

The course gives a general knowledge of methods and technologies for the analysis of biomolecules.

COURSE OBJECTIVES:

To help the students

- understand the techniques involved in the qualitative analysis of Biomolecules.
- comprehend the biochemical preparation from natural sources.
- recognize the instrumentation and principle behind colorimeter and pH meter.
- analyze and compare the properties of various biomolecules.

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	infer the normal constituents of Carbohydrates, protein, lipid, amino acid and their significance.	Upto K3
CO 2	infer the findings of the biochemical reactions and report the results	Upto K3
CO 3	quantitatively analyze the constituents of carbohydrates using standard methods.	Upto K3
CO 4	estimate the variations in the levels of pH and using colorimeter.	Upto K3
CO 5	analyze and compare the properties of various biomolecules.	Upto K3

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



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CORE PRACTICAL – I: LAB IN BIOMOLECULE ANALYSIS

1. Qualitative analysis of bioorganic compounds
 - a. Analysis of Carbohydrates
 - b. Analysis of amino acids
 - c. Test for proteins
 - d. Test for lipids
 - e. Qualitative tests for DNA and RNA
2. Biochemical preparation
 - a. Starch from potato
 - b. Casein from milk
3. Use of pH meter for the preparation of buffer
4. Verification of Beer–Lambert's law using colorimeter.
 - a. Determining the concentration of any given–colored compounds using standard graph.

TEXT BOOK:

Jayaraman J. (2011). *Laboratory Manual in Biochemistry*. 2nd edition, New Age International Publishers.

REFERENCE BOOKS:

1. Sadasivam S. and Manickam A. (1996) *Biochemical Methods*. II Edition, New Age International Pvt. Ltd.
2. David T. Plummer (2001). *An Introduction to Practical Biochemistry*. 3 rd edition, Tata McGraw– Hill Publishing Company Limited.

DIGITAL TOOLS:

1. https://bio.libretexts.org/Bookshelves/Biotechnology/Lab_Manual%3A_Introduction_to_Biotechnology/01%3A_Techniques/1.09%3A_Biomolecule_Detection
2. <http://mrmitchellsbiology.weebly.com/biomolecules-indicator-lab.html>
3. <https://www.studocu.com/en-ca/document/dawson-college/general-biology-ii/bze-w21-lab-1-analysis-of-biomolecule-intro/15114297>
4. <https://conductscience.com/biomolecules-types-and-functions/>
5. <https://www.studysmarter.co.uk/explanations/biology/organ-systems/biomolecule-test/>

Mapping of CO with PSO

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

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCA11	GENERAL CHEMISTRY	ALLIED – 1	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course introduces the fundamentals of atomic structure, delves into the theories of atomic connections utilizing the periodic table, and provides a comprehensive understanding of diverse bond types. Furthermore, it covers essential aspects of organic chemistry, solutions and surface chemistry to build a solid knowledge base in these areas.

COURSE OBJECTIVES:

This course aims to help the students

- Gain insight into the structural composition of atoms.
- Explore the diverse spectrum of bond types in chemistry.
- Study about the basic concepts in organic chemistry.
- Develop a foundational understanding of solutions.
- Investigate the fundamental principles underlying surface chemistry.

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	explore the foundational principles of atoms and elucidate the periodic trends observed among elements within the periodic table.	Upto K3
CO 2	analyse the types of chemical bonding.	Upto K3
CO 3	gain a comprehensive understand the fundamental concepts in organic chemistry.	Upto K3
CO 4	categorize and understand various concepts in solutions.	Upto K3
CO 5	gain the knowledge of catalysis and adsorption.	Upto K3

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



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GENERAL CHEMISTRY

UNIT – I: ATOMIC STRUCTURE AND PERIODIC TRENDS [12 Hrs]

Constituents of atom – atomic number – mass number – isotopes – isobars – shapes of orbitals – quantum numbers – Aufbau principle – Hund's rule – Pauli's exclusion principle – electronic configuration of atoms – salient features of modern periodic table. Atomic radii, Covalent radii, Electron affinity, Electronegativity (Definition and its trends).

UNIT – II: CHEMICAL BONDING [12 Hrs]

Ionic, covalent, polar covalent and co-ordinate bonds (definition, characteristics and examples) – Intermolecular forces: van der Waals forces – dipole–dipole, dipole– induced dipole, induced dipole– induced dipole interactions – Hydrogen bonding: definition, conditions for formation, types and characteristics of hydrogen bonded compounds.

UNIT – III: FUNDAMENTAL CONCEPTS IN ORGANIC CHEMISTRY [12Hrs]

a) Nature of valency of carbon in organic compounds – tetrahedral arrangements of carbon – bond breaking and bond forming in organic reactions – homolytic cleavage – heterolytic cleavage – reaction intermediates – formation and stability of carbocations, carbanions and free radicals.

b) Reagents: Nucleophilic and electrophilic – types and examples.

c) Types of organic reactions: addition, substitution, elimination, rearrangement and polymerization (examples only).

UNIT – IV: SOLUTIONS [12 Hrs]

Definition – types of solutions – concentration – solute – solvent – molecular weight – equivalent weight – various ways of expressing concentration of solutions: molarity, molality, normality, formality, mole fraction, ppm, w/w, w/v, v/v (problems involving direct substitution only) – osmosis and its applications – isotonic solutions and its biological importance – hypertonic and hypotonic solutions – reverse osmosis and its applications.

UNIT – V: SURFACE CHEMISTRY [12 Hrs]

a) **Catalysis:** Definition – general characteristics of catalytic reactions – types of catalyst (positive and negative) – types of catalysis (homogeneous and heterogeneous) – acid – base catalysis – auto – catalysis – enzyme catalysis – catalytic promoters – catalytic poisons – theories of catalysis.

b) **Adsorption:** Definition – various terms involve in adsorption – types of adsorptions – physical and chemical adsorption – factors influencing adsorption – applications of adsorption.



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TEXT BOOKS:

1. *Principles of Physical Chemistry* by B.R. Puri, L.R. Sharma and S. Pathania – Vishal Publishing Co. 43rd Edn. (2022)
2. *Principles of Inorganic Chemistry* by Puri, Sharma & K.C. Kalia, Milestone publishers, 48th Edn. (2019).
3. *Modern Organic Chemistry* by M. K. Jain and S. C. Sharma –Vishal Publishing Co. 4th Edn. (2014).

REFERENCE BOOKS:

1. *Modern Inorganic Chemistry* by R.D. Madan, S. Chand and Co. Ltd. (2012).
2. *Essentials of Physical Chemistry* by B. S. Bahl, Arun Bahl and G. D. Tuli, S. Chand and Co. Ltd. (2016).
3. *A Text book of Organic Chemistry* by B. S. Bahl, Arun Bahl and G. D. Tuli, S. Chand and Co. Ltd. (2019).

DIGITAL TOOLS:

1. <https://youtu.be/hePb00CqvP0?si=Y9tTImddawf2CB0p>
2. https://youtu.be/7cEtOHLZQ2A?si=bpvx_mGoqFDYKYGM
3. <https://youtu.be/PoQjsnQmxok?si=9koWqAmitFuW8ljG>
4. <https://www.youtube.com/watch?v=BketdzJtY8>
5. https://youtube.com/shorts/S53WAct-m3o?si=IGvhho_8jgrRO6mJ
6. <https://youtu.be/knu5pyLHmsI?si=NI-D3EN0u0jL1kDz>

Mapping of CO with PSO

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

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

COURSE DESIGNER: Dr. T. S. MANIKANDAN



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCAP1	VOLUMETRIC ANALYSIS	ALLIED PRACTICAL	-	2	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	-	-	-

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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Practical Examinations at the end of the II Semester

COURSE DESCRIPTION:

This course gives the practical knowledge in volumetric analysis.

COURSE OBJECTIVE:

A double titration involving the making up of the solution to be estimated and the preparation of primary standard solutions.

COURSE OUTCOMES (CO):

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	Illustrate the estimation of substance by various types of titration method	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLY

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard Solution



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VOLUMETRIC ANALYSIS

LIST OF EXPERIEMENTS:

1. ACIDMETRY AND ALKALIMETRY

1. Titration between a strong acid and strong base
2. Titration between a strong acid and weak base
3. Titration between a weak acid and strong base

2. PERMANGANOMETRY

4. Titration between potassium permanganate and oxalic acid
5. Titration between potassium permanganate and ferrous sulphate
6. Titration between potassium permanganate and Mohr's salt

3. EDTA TITRATIONS (DEMONSTRATION ONLY)

7. Estimation of Ca^{2+} ions in water using EDTA
8. Estimation of Mg^{2+} ions in water using EDTA

Summative Examination at the end of Semester II

Max. marks – 100

Distribution of Marks: Internal – 40 Marks
External – 60 Marks

Duration of Examination: 3 hrs

Internal

Class Experiments : 30 marks
Observation note book : 10 marks
Total : 40 marks

External examination

Record Notebook : 10 marks
Procedure writing : 10 marks
Experiment : 40 marks
Total : 60 marks

For Estimation, if the student has

< 2% error – 40 marks
2–3% error – 35 marks
3–4% error – 30 marks
4–5% error – 25 marks
> 5% error – 15 marks

TEXT BOOK:

1. *Vogel's Textbook of Quantitative Inorganic Analysis* 4th Edn. (1978).

REFERENCE BOOK:

1. *Basic Principles of Practical Chemistry* by V. Venkatheswaran, R. Veeraswamy and A. R. Kulandaivelu, 2nd Edn. S. Chand and Co. Ltd. (2015).

DIGITAL SOURCES:

1. <https://www.youtube.com/watch?v=V9tAQl2XcHw>
2. <https://www.youtube.com/watch?v=cEOvj6jkdDw>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNER: Dr. T. S. MANIKANDAN



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCS11	NUTRITIONAL BIOCHEMISTRY	SBS – 1	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

COURSE DESCRIPTION:

This course provides introduction to biochemistry of macro– and micronutrients with a limited focus on medical aspects of nutrient deficiencies and metabolism.

COURSE OBJECTIVES:

- To understand the impact of nutrition in human system.
- To appreciate and recognize the nutritional requirements and calorific values in daily diet plan.
- To comprehend the nutritional requirements at various stages of human life span.

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	understand the simple concepts related to nutrition.	Upto K3
CO 2	appreciate the correlation between food and energy requirements and utilization.	Upto K3
CO 3	realize the body requirements of biomolecules in specific quantities and its deficiency or excess leading to disorders.	Upto K3
CO 4	apply the concepts of nutritional status and energy needs in various stages of human life.	Upto K3
CO 5	define the prominence of functional foods and nutraceuticals	Upto K3

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



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NUTRITIONAL BIOCHEMISTRY

UNIT – I:

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. food habits, food fads and fallacies, changing food habits.

UNIT – II:

Proteins: food sources, complete and incomplete proteins – Energy: Basal metabolism, measurement of BMR, factors affecting BMR, total energy requirement and energy value of foods, functions of food and its relation to nutritional and clinical aspects.

UNIT – III:

Protein nutritional Nitrogen balance, proteins requirements, Protein nutrition abnormalities, Protein deficiency disorder/ PEM– Balanced diet formulation – Assessment of nutritional status – vitamins – deficiency disorders.

UNIT – IV:

Nutrition at various stages of growth and development – Diet chart for infants, children, adolescents, pregnant women, lactating mothers and older persons, micro nutrition at various stages of growth and development.

UNIT – V:

Nutraceuticals and Functional Foods: Definition, properties and function of Nutraceuticals, food Supplements, dietary supplements prebiotics and probiotics, and functional Foods, Food Safety & Food Adulterants.

TEXTBOOKS:

- Swaminathan, M. (1993). *Principles of Nutrition and Dietetics*, 2nd Edition. Bangalore: Bappco Publications
- Patricia, (2011). *Nutritional Biochemistry*, 1st Edition. Chennai: MJP Publishers

REFERENCEBOOKS:

- Srilakshmi, B. (2008). *Nutrition Science*, 3rd Edition. New Delhi: New age International (P) Limited Publishers.
- Swaminathan, M. (2015). *Advanced Textbook on Food and Nutrition– Vol-I&II*, 2nd Edition. Bangalore: Bappco Publications.
- Corinne Robinson (1982). *Normal and Therapeutic Nutrition*, 16th Edition. London: Collier Macmillan Publishers.
- Swaminathan, M. (1981). *Handbook of Food and Nutrition*, 5th edition. Bangalore: Bappco Publications.

DIGITAL TOOLS:

- <https://prog.lmu.edu.ng/colleges\CMS/document/books/BCH%20412%20module%201.pdf>
- <https://www.ajpbp.com/ajpbp-articles/an-overview-of-nutritional-biochemistry-87767.html>
- <https://www.egyankosh.ac.in/bitstream/123456789/73092/1/MFN-002E.pdf>
- <https://www.studocu.com/en-gb/document/edge-hill-university/nutrition-and-metabolism/nutritional-biochemistry-lecture-notes/11351121>
- https://www.researchgate.net/publication/362791357_NutritionalBiochemistry

Mapping of CO with PSO

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

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

COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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COURSE STRUCTURE – SEMESTER II

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	C A	SE	Total Marks	Credits
1.	24UACT21	Part – I: Tamil – பொதுத் தமிழ் – II	6	3	25	75	100	3
	24UACH21	Hindi – General Hindi – II						
	24UACS21	Sanskrit – Prose, Grammar and History of Sanskrit Literature						
2	24UACE21	Part – II: English – General English – II	6	3	25	75	100	3
3	24UBCC21	Part – III: Core – 2: Biochemical Techniques	5	3	25	75	100	4
4	24UBCCP1	Part – III: Core Practical - I: Lab in Biomolecule analysis	3	3	40	60	100	4
5	24UBCA21	Part – III: Allied – 2: Allied Chemistry for Life Sciences	4	3	25	75	100	4
6	24UBCAP1	Part – III: Allied Practical - I: Volumetric Analysis	2	3	40	60	100	4
7	24UBCS21	Part – IV: SBS – 2: Pharmacology	2	3	25	75	100	2
8	24UACES2	Part – IV: Environmental Studies	2	3	25	75	100	2
		TOTAL	30				800	26

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCC21	BIOCHEMICAL TECHNIQUES	CORE – 2	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This introduces students to all the experimental principles and techniques used in practical biochemistry and molecular biology.

COURSE OBJECTIVES:

To help the students

- understand the impact of the scientific instrumentation in the area of research.
- understand to various chromatographic techniques and fundamentals of radioactivity.
- appreciate electrophoretic and electrochemical principles in separation of compounds.
- develop the skills to understand the theory and practice of bio analytical techniques.
- receive scientific understanding of analytical techniques and detail interpretation of results.

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	understand the impact of spectroscopy in biochemical research.	Upto K3
CO 2	comprehend the applications of centrifugation in biological investigation.	Upto K3
CO 3	develop competence in handling various chromatographic techniques and apply them in isolating and characterizing different biological molecules.	Upto K3
CO 4	realize the principles of electrophoresis and its applications.	Upto K3
CO 5	comprehend the importance and applications of radioactive isotope in biology.	Upto K3

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



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BIOCHEMICAL TECHNIQUES

UNIT – I:

Spectroscopy: Colorimetry, Beer–Lambert’s law. Principle, Components and applications of spectrophotometer. Principle, instrumentation and applications of flame photometer, atomic absorption, NMR, ESR and mass spectroscopy.

UNIT–II:

Basic principles of centrifugation – relative centrifugal force, factors affecting centrifugation, Centrifuge – types and instrumentation.

UNIT–III:

Chromatography – Introduction, definition, types – Column, Paper and Thin layer chromatography, adsorption partition, affinity, Ion exchange, Gas chromatography, HPLC, Gel filtration and application of chromatography techniques.

UNIT–IV:

Electrophoresis– Introduction, definition, principle, factors affecting electrophoresis, types – Agarose, SDS PAGE, paper electrophoresis, 2D gel electrophoresis, isoelectric focusing– applications of electrophoresis, Advanced Techniques in Diagnostics.

UNIT–V:

Radioisotopes in Biochemistry: Radioactivity, radioactive decay, units of radioactivity, measurement of radioactivity – principle, instrumentation and application – Geiger–Muller counter, scintillation counter, autoradiography–Applications of radioisotopes in biology.

TEXTBOOKS:

1. Upathayaye and Nath (2002) *Biophysical Chemistry – Principles and Techniques*, 3rd edition, Himalaya Publishers.
2. Wilson and Walker (2000) *Principles and Techniques of Practical Biochemistry*, 5th edition, University Press, Cambridge.
3. Asokan P. (2005) *Analytical Biochemistry* 2nd edition, Chinna Publications.

REFERENCEBOOKS:

1. Sadasivam S. and Manickam A. (1996) *Biochemical Methods*. II Edition, NewAge International Pvt. Ltd.
2. David T. Plummer (2001) *An Introduction to Practical Biochemistry*. 3rd edition, Tata McGraw– Hill Publishing Company Limited.
3. Mark F. Vitha. (2018). *Spectroscopy: Principles and Instrumentation*. Wiley

DIGITAL TOOLS:

1. https://www.brainkart.com/article/Biochemical–Techniques_34119/
2. <https://biochemden.com/biochemical–techniques–basics/>
3. https://www.researchgate.net/publication/356632707_Biochemical_technique_For_Graduate_Student
4. <https://egyankosh.ac.in/bitstream/123456789/76754/3/BBCS–183%28English%29.pdf>
5. [https://bio.libretexts.org/Bookshelves/Biochemistry/Book%3ABiochemistry_Free_For_All_\(Ahern_Rajagopal_and_Tan\)/08%3ABasic_Techniques](https://bio.libretexts.org/Bookshelves/Biochemistry/Book%3ABiochemistry_Free_For_All_(Ahern_Rajagopal_and_Tan)/08%3ABasic_Techniques)

Mapping of CO with PSO

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

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

COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCCP1	LAB IN BIOMOLECULE ANALYSIS	CORE PRACTICAL	–	3	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input checked="" type="checkbox"/>
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COURSE DESCRIPTION:

The course gives a general knowledge of methods and technologies for the analysis of biomolecules.

COURSE OBJECTIVES:

To help the students

- understand the techniques involved in the qualitative analysis of Biomolecules.
- comprehend the biochemical preparation from natural sources.
- recognize the instrumentation and principle behind colorimeter and pHmeter.
- analyze and compare the properties of various biomolecules.

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	infer the normal constituents of Carbohydrates, protein, lipid, amino acid and their significance.	Upto K3
CO 2	infer the findings of the biochemical reactions and report the results	Upto K3
CO 3	quantitatively analyze the constituents of carbohydrates using standard methods.	Upto K3
CO 4	estimate the variations in the levels of pH and using colorimeter.	Upto K3
CO 5	analyze and compare the properties of various biomolecules.	Upto K3

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



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CORE PRACTICAL – I: LAB IN BIOMOLECULE ANALYSIS

1. Qualitative analysis of bioorganic compounds
 - a. Analysis of Carbohydrates
 - b. Analysis of amino acids
 - c. Test for proteins
 - d. Test for lipids
 - e. Qualitative tests for DNA and RNA
2. Biochemical preparation
 - a. Starch from potato
 - b. Casein from milk
3. Use of pH meter for the preparation of buffer
4. Verification of Beer–Lambert’s law using colorimeter.
 - a. Determining the concentration of any given–colored compounds using standard graph.

TEXT BOOK:

Jayaraman J. (2011). *Laboratory Manual in Biochemistry*. 2nd edition, New Age International Publishers.

REFERENCE BOOKS:

1. Sadasivam S. and Manickam A. (1996) *Biochemical Methods*. II Edition, New Age International Pvt. Ltd.
2. David T. Plummer (2001) *An Introduction to Practical Biochemistry*. 3 rd edition, Tata McGraw– Hill Publishing Company Limited.

DIGITAL TOOLS:

- https://bio.libretexts.org/Bookshelves/Biotechnology/Lab_Manual%3A_Introduction_to_Biotechnology/01%3A_Techniques/1.09%3A_Biomolecule_Detection
- <http://mrmitchellsbiology.weebly.com/biomolecules-indicator-lab.html>
- <https://www.studocu.com/en-ca/document/dawson-college/general-biology-ii/bze-w21-lab-1-analysis-of-biomolecule-intro/15114297>
- <https://conductscience.com/biomolecules-types-and-functions/>
- <https://www.studysmarter.co.uk/explanations/biology/organ-systems/biomolecule-test/>

Mapping of CO with PSO

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

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI



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B.Sc. BIOCHEMISTRY – SYLLABUS

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCA21	ALLIED CHEMISTRY FOR LIFE SCIENCES	ALLIED – 2	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course will develop comprehensive understanding of acids and base concepts, Explore the classification, properties, and multifaceted applications of carbohydrates, gain foundational knowledge about vitamins, acquire understanding about alkaloids, terpenoids, and delve into pharmaceutical chemistry within this course.

COURSE OBJECTIVES:

This course aims at giving an overall view to

- Gain a foundational understanding of acids and base.
- Familiarize yourself with the classification, properties, and diverse applications of carbohydrates.
- Identify the biological functions of vitamins and comprehend their role in deficiencies.
- Understand the occurrence, extraction methods, classification, structures, and biological significance of alkaloids and terpenoids.
- Recognize the classification, properties, and impact of analgesics, antipyretics, anaesthetics, and antibiotics.

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	grasp the fundamental concepts of acids and base in inorganic chemistry.	Upto K3
CO 2	comprehend the structural organization, chemical properties, and diverse applications of carbohydrates.	Upto K3
CO 3	identify the biological functions of vitamins and their implications in deficiency diseases.	Upto K3
CO 4	understand the occurrence, structural variations, and biological significance of alkaloids and terpenoids.	Upto K3
CO 5	appreciate the classification, structural aspects, and therapeutic applications of analgesic, antipyretic, anesthetic, and antibiotic drugs.	Upto K3

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



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ALLIED CHEMISTRY FOR LIFE SCIENCES

UNIT – I: CONCEPT OF ACIDS AND BASES: [12Hrs]

Arrhenius concept, Bronsted–Lowry concept, conjugate acid– base pairs, Lewis concept– ionic product of water – pH and pOH – pH meter– buffer solutions and its types – Henderson equation – biological applications of buffer solutions – acid–base titrations – indicators – theory of indicators.

UNIT – II: CARBOHYDRATES: [12Hrs]

Definition – classification – monosaccharides: chemical properties of glucose and fructose – uses – disaccharides: sucrose– manufacture and properties–polysaccharides: study of starch and cellulose (structure) – applications – colour reactions.

UNIT– III: VITAMINS: [12Hrs]

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

UNIT – IV: ALKALOIDS AND TERPENOIDS: [12Hrs]

a) **ALKALOIDS:** Definition – occurrence – extraction – general properties – classification – structure (no elucidation) and biological importance of cocaine, nicotine and piperine.

b) **TERPENOIDS:** Definition – occurrence – isolation – isoprene rule – classification – general properties – structure (no elucidation) and biological importance of citral, geraniol and menthol.

UNIT– V: DRUGS : [12Hrs]

a) **ANALGESICS AND ANTIPYRETICS:** Definition – types – narcotic analgesics: morphine, pethidine and methadone – non–narcotic analgesics: aspirin, methyl salicylate, paracetamol – structure and uses.

b) **ANAESTHETICS:** Definition – characteristics – classification – general anaesthetics: chloroform, nitrous oxide, cyclopropane – local anaesthetics: cocaine, procaine, amethocaine – structure and uses.

c) **ANTIBIOTICS:** Definition – condition – classification – structure and therapeutic uses of penicillin, streptomycin, chloramphenicol and tetracycline.

TEXT BOOKS:

1. *A Text Book of Organic Chemistry* by B.S. Bahl & Arun Bahl., S. Chand Publishing, (2019).
2. *Textbook of Organic Chemistry* by P.L. Soni & H.M. Chawla, S. Chand & Co. (2016).
3. *A Textbook of Pharmaceutical Chemistry* by Jayashree Ghosh, S. Chand & Co (2019).

REFERENCE BOOKS:

1. *Advanced Organic Chemistry* by Arun Bahl and B.S. Bahl, S Chand Publishing, (2022).
2. *Organic Chemistry of Natural Products (vol – I)* by Gurdeep Chatwal., Himalaya publishing house (2019).
3. *Organic Chemistry of Natural Products (vol – II)* by Gurdeep Chatwal., Himalayapublishing house (2019).



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DIGITAL TOOLS:

1. <https://youtu.be/EyBkPwsRY2E?si=6K3sl-zOJmQXk9iE>
2. <https://youtu.be/F59RwK9hya8?si=nwzxBkzs0YM0GGDB>
3. https://youtu.be/QbN8e7XMFSM?si=98pHiNdoJeC1_7Mj
4. <https://youtu.be/5kCJwE4DC0w?si=py1Vr5ipsnATY5rf>
5. <https://youtu.be/sGrwIVfshBg?si=0GiYaM9tvIGI1BDr>
6. <https://youtu.be/1TX0HKpq-E4?si=JgINBliMdfHXB86j>

Mapping of CO with PSO

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

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNER: Dr. T. S. MANIKANDAN



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCAP1	VOLUMETRIC ANALYSIS	ALLIED PRACTICAL	–	2	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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Practical Examinations at the end of the II Semester

COURSE DESCRIPTION:

This course gives the practical knowledge in volumetric analysis.

COURSE OBJECTIVE:

A double titration involving the making up of the solution to be estimated and the preparation of primary standard solutions.

COURSE OUTCOME (CO):

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

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	illustrate the estimation of substance by various types of titration method	Upto K3

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

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard Solution



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LIST OF EXPERIEMENTS:

1. ACIDMETRY AND ALKALIMETRY

4. Titration between a strong acid and strong base
5. Titration between a strong acid and weak base
6. Titration between a weak acid and strong base

2. PERMANGANOMETRY

9. Titration between potassium permanganate and oxalic acid
10. Titration between potassium permanganate and ferrous sulphate
11. Titration between potassium permanganate and Mohr's salt

3. EDTA TITRATIONS (DEMONSTRATION ONLY)

12. Estimation of Ca^{2+} ions in water using EDTA
13. Estimation of Mg^{2+} ions in water using EDTA

Summative Examination at the end of semester II

Max. marks –100

Distribution of Marks: Internal – 40 Marks
External – 60 Marks

Duration of Examination: 3 hrs

Internal

Class Experiments : 30 marks
Observation note book : 10 marks
Total : 40 marks

External examination

Record Notebook : 10 marks
Procedure writing : 10 marks
Experiment : 40 marks
Total : 60 marks

For Estimation, if the student has
< 2% error – 40 marks
2–3% error – 35 marks
3–4% error – 30 marks
4–5% error – 25 marks
> 5% error – 15 marks

TEXT BOOK:

Vogel's Textbook of Quantitative Inorganic Analysis 4th Edn. (1978).

REFERENCE BOOK:

Basic Principles of Practical Chemistry by V. Venkatheswaran, R. Veeraswamy and A. R. Kulandaivelu, 2nd Edn. S. Chand and Co. Ltd. (2015).

DIGITAL SOURCES:

3. <https://www.youtube.com/watch?v=V9tAQI2XcHw>
4. <https://www.youtube.com/watch?v=cEOvj6jkdDw>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO	3	3	3	3	3	3

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

COURSE DESIGNER: Dr. T. S. MANIKANDAN



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBCS21	PHARMACOLOGY	SBS – 2	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

The course is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases.

COURSE OBJECTIVES:

To make the students

- learn basic scientific concepts and principles that will serve as the foundation for understanding the pharmacology of specific drugs.
- understand the Pharmacology and clinical use of the major class of clinically important drugs.
- explain the mechanism of drug actions at cellular and molecular level.
- understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.

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	understand the basic scientific concepts and principles that serve as the foundational underpinnings of the pharmacological sciences.	Upto K3
CO 2	appreciate the fundamental pharmacological properties that influences drug metabolism.	Upto K3
CO 3	explicate the mechanism of drug action at organ system/subcellular/macromolecular levels.	Upto K3
CO 4	ascertain the scientific valuation of traditional drugs.	Upto K3
CO 5	understand and apply the adverse reactions of drugs	Upto K3

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



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PHARMACOLOGY

UNIT – I:

Principle and concept of Pharmacology – Classification of drugs based on source – site of action, absorption of drugs, drugs distribution and elimination.

UNIT – II:

Drugs metabolism – chemical pathways of drug metabolism. Enzymatic & Non – Enzymatic Process. Phase I and Phase II reactions, role of cytochrome P450 , non–microsomal reactions of drug metabolism.

UNIT – III:

Principles and mechanism of drug action, Factors affecting drug action, routes of drug administration.

UNIT – IV:

Scientific evaluation of traditional drugs. Herbal drug formulation & acute toxic test on animals.

UNIT – V:

Adverse response and side effects of drugs, allergy, Drug intolerance, Drug addiction, drug abuses and their biological effects.

TEXT BOOKS:

1. Tripathi K.D (2010). *Essentials of Medical Pharmacology*, 7th edition, Jaypee Brothers.
2. Satoskar R.S., Nirmala Rege and Bhandarkar S.D (2017). *Pharmacology and Pharmacotherapeutics*, 25th Kindle Edition, India, Elsevier publication.
3. BasuD.K. (2017). *Essentials of Pharmacology*, 1 Edition, New Delhi: CBS Publishers & Distributors

REFERENCEBOOKS:

1. Metha S C. and Ashutosh Kar. (2011). *Pharmaceutical Pharmacology*, 3rd Edition, New Delhi, New age International publishers.
2. William O Foye., Thomas L Lemke, David A Williams, Victoria F Roche, S William Zito. (2012). *Foye's Principles of Medicinal Chemistry*, 7th Edition, Creighton University, Omaha, Wolters Kluwer Health Adis (ESP)

DIGITAL TOOLS:

- <https://ocw.mit.edu/courses/hst-151-principles-of-pharmacology-spring-2005/pages/lecture-notes/>
- <http://repo.upertis.ac.id/1876/1/Basic%20Concepts%20In%20Pharmacology.pdf>
- <https://drnaitiktrivedi.com/index.php/notes/pharmacology-theory-notes/>
- <https://faculty.uobasrah.edu.iq/uploads/1632245048.pdf>
- <https://core.ac.uk/download/pdf/200104466.pdf>

Mapping of CO with PSO

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

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNERS: Dr. K. RAGHAVAN & Mrs. A. R. SARANYADEVI

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman