



SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

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Ready for
Every Good Work

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

Department: B.Sc.BioChemistry

B. Sc. Bio-Chemistry

SEM	Sub Code	Title of the Subject	Hours	Credit	E-Hrs	CA	SE	Total
I SEMESTER	LT114	Tamil-I	5	3	3	50	50	100
	LE115AT	English-I	5	2	3	50	50	100
	LE115AP	English Lab-I	-	1	-	-	-	-
	BC106	Cell Biology	3	3	3	50	50	100
	BC107	Biomolecules	4	4	3	50	50	100
	PBC102	Main practical- I	3	3	3	50	50	100
	ACH110	Allied Chemistry-I	4	3	3	50	50	100
	PACH209	Allied Chemistry Lab Work	2	-	-	50	50	100
	SK104	Communication Skills	2	1	-	-	-	-
	VE105A/B	Religion/Value Education-I	2	1	-	-	-	-
	CE103	Communicative English-I	-	1	-	-	-	-
TOTAL			30	22	-	-	-	-
II SEMESTER	LT214	Tamil-II	5	3	3	50	50	100
	LE215AT	English-II	5	2	3	50	50	100
	BC206	Plant Biochemistry	3	3	3	50	50	100
	BC207	Human physiology	4	4	3	50	50	100
	PBC205	Main practical-II	3	3	3	50	50	100
	ACH210	Allied Chemistry-II	4	3	3	50	50	100

	PACH209	Allied Chemistry Lab Work	2	2	3	50	50	100
	SK204	Leadership skills	2	1	-	-	-	-
	VE205A/B	Religion/Value Education-II	2	1	-	-	-	-
	CE203	Communicative English-II	-	1	-	-	-	-
	TOTAL		30	23	-	-	-	-
III SEMESTER	LT312	Tamil-III	5	3	3	50	50	100
	LE309T	English-III	5	2	3	50	50	100
	BC306	Microbiology	3	3	3	50	50	100
	BC307	Biophysical chemistry	4	4	3	50	50	100
	PBC302	Main practical-III	3	3	3	50	50	100
	AM310C	Allied Biostatistics-I	6	5	3	50	50	100
	SK304	Technical Skills-I	2	1	-	-	-	-
	VE306	Human Rights	2	1	3	50	50	100
	LE309P	English Lab-III	-	1	-	-	-	-
		OUTREACH	-	-	-	-	-	-
		SHELTERS	-	-	-	-	-	-
	TOTAL		30	23	-	-	-	-
IV SEMESTER	LT411	Tamil-IV	5	3	3	50	50	100
	LE409T	English-IV	5	2	3	50	50	100
	BC407	Microbial Biochemistry	3	3	3	50	50	100
	BC408	Analytical Biochemistry	4	4	3	50	50	100
	PBC405	Main practical-IV	3	3	3	50	50	100
	AM409C	Allied Biostatistics-II	6	5	3	50	50	100
	SK404	Employability Skills	2	1	-	-	-	-
	VE406	Environmental Science	2	1	3	50	50	100
	LE409P	English Lab-IV	-	1	-	-	-	-
		OUTREACH	-	2	-	-	-	-
		SHELTERS	-	2	-	-	-	-

		Internship		1*	-	-	-	-
	TOTAL		30	27+1*	-	-	-	-
V SEMESTER	BC522	Enzymology	4	4	3	50	50	100
	BC523	Intermediary metabolism	5	5	3	50	50	100
	BC524	Endocrinology	4	4	3	50	50	100
	BC525	Genetics	4	4	3	50	50	100
	PBC502	Main practical-V	5	4	6	50	50	100
	BC526A/B/C	<ul style="list-style-type: none"> • Biomedical Instrumentation • Medical laboratory technology • Pharmacology (one out of three) 	6	4	3	50	50	100
	SSP-I	Health Management	-	1*	-	-	-	-
NBC504	NME –Energy Builders	2	1	3	50	50	100	
	TOTAL		30	26 + 1*	-	-	-	-
VI SEMESTER	BC620	Molecular Biology	5	5	3	50	50	100
	BC621	Immunology	4	4	3	50	50	100
	BC622	Medical Biochemistry	4	4	3	50	50	100
	PBC606	Main practical-VI	5	4	6	50	50	100
	BC623A	Subject Skill-I Biotechnology	5	5	3	50	50	100
	BC623B	Subject Skill-II Bioethics	5	5	3	50	50	100
	SSP-II	Nutritional Biochemistry	-	1*	-	-	-	-
	NBC604	NME – Health care and Disease management	2	1	3	50	50	100
		Certificate Courses NPTEL/MOOCs	-	1*	-	-	-	-
		Project	-	2*	-	-	-	-
	TOTAL		30	28 + 4*	-	-	-	-

UNIT-I: Microbiology–History, Branches and Scope. Spontaneous generation–Abiogenesis and Biogenesis; Contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, and Alexander Fleming.

UNIT-II: Microscopy–Principles and applications of Bright field; Dark field; Phase contrast microscope and Fluorescence microscope; Principles and Applications of Electron Microscopy–SEM and TEM.

UNIT-III: Bacteria–Ultra structure; Classification (Gram positive and Gram negative); Shape and arrangement; Cell wall polysaccharides; Growth curve and Factors affecting microbial growth. Fungi (Mold and Yeast), Algae and Protozoa - Ultra structure, Characteristics and Economic importance.

UNIT-IV: Virus - General properties, Structure and Classification; Plant (TMV & CMV) and Animal viruses (Dengue & Corona); Viroids and Prions; Bacteriophage–Structure, Lytic and Lysogenic cycle.

UNIT-V: Sterilization–Dry heat, Moist heat, Filtration and Radiation; Disinfection and Disinfectants; Culture medium, Staining techniques–Gram staining and Acid fast staining; Antibiotic sensitivity test.

Text Books:

1. M.J. Pelczar Jr, E.C.S. Chan and N.R. Kreig (2006). “Microbiology”- 5th Edition Mc Graw Hill Inc. New York.
2. Park William Halock (2001) Pathogenic Microorganisms, Leafebiger, Philadelphia.

References:a

1. R. Ananthanarayan and C.K. Jayaram Paniker (2000). Text book of Microbiology. 6th Edition, Orient Longman Limited, Chennai.
2. P. Chakraborty (2003). A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.
3. R.C. Dubey and D.K. Maheswari, (2010). A Text book of Microbiology. 3rd Edition, S. Chand Publishing, New Delhi.
4. H.Frobisher, R.D.Hinsdil, K.T.Crabtree and D.R.Goodhert (2005). Fundamentals of Microbiology, Saunder and Compa
5. C.B. Powar and H.F. Dagainawala, (2008). General Microbiology. Volume: II. Himalaya Publishing House.

Semester-III

Sub. Code: BC307

BIOPHYSICAL CHEMISTRY

4 Hours/4 Credits

Course Objectives:

- To understand about the measurement of solutes in solution and learn the basic concepts in biophysical chemistry.
- To learn the regulation of pH the various buffer systems.
- To acquire in-depth understanding on the principles of electrochemical techniques, instrumentation and applications of reference electrodes.
- To learn the laws of thermodynamics, reversible and irreversible process and their applications.
- To acquire knowledge on viscosity coefficient, surface tension and their applications.

Course outcomes:

S.No.	Description	Cognitive Level (K-level)
CO-1	Develop an understanding on the measurement of solutes in solutions namely normality, molality and molarity.	K6
CO-2	Define and understand osmosis, diffusion and its various applications	K1
CO-3	Categorize acids with bases and functions of various buffer systems.	K4
CO-4	Determine the principles of electrochemical techniques, instrumentation and applications of reference electrodes.	K3
CO-5	Demonstrate a clear understanding of thermodynamics, reversible and irreversible processes.	K2
CO-6	Evaluate the mechanism of surface tension and their applications.	K5

UNIT-I: Units of measurement of solutes in solution, normality, molality, molarity, and milliosmol, Percentage solution examples for this concept. Ionic strength, Isotonic, hypertonic and hypotonic solution. Diffusion, Osmosis and its applications.

UNIT-II: Acid and bases, Arrhenius, Lowry & Bronsted concept, Lewis concept–conjugated pairs. pH, pOH, buffer, buffering capacity, common ion effect. Henderson–Hasselbalch equation. Buffer systems–Bicarbonate, Phosphate, Protein & Haemoglobin buffers.

UNIT-III: Principles of electrochemical techniques, Reference electrodes – Silver and Calomel electrode. Determination of pH using pH indicator, Universal indicators, pH paper & pH meter- Instrumentation and applications, Hydrogen electrode and glass electrodes.

UNIT-IV: First law of thermodynamics, Work, heat, free energy, enthalpy and entropy, exothermic and endothermic reactions, Reversible & irreversible process, isothermal and adiabatic process, Hess's law and its applications, Kirchoff's equation, relations between C_p & C_v .

UNIT-V: Definition and determination of viscosity coefficient. Poiseuille's equation, Stoke's law and terminal velocity. Surface tension: Definition, determination of surface tension, temperature effect. Equilibrium constant, Le-Chatelier's principle and applications.

Text Books:

1. B.R. Puri, L.R. Sharma, M.S. Pathania (2016), Principles of Physical Chemistry. 47th Ed., Vishal Publishing Co.
2. K.Wilson and J. Walker (2006), Practical Biochemistry – Principles and techniques of Biochemistry and Molecular Biology, sixth Edition, Cambridge University Press, New York, USA.

References:

1. Upadhyay, K. Upadhyay and N. Nath (2007), Biophysical chemistry, Third revised edition, Himalaya publishing House, Mumbai.
2. Vasantha Pattabhi and Gautham, (2002), Biophysics, second reprint 2005. Narosa Publishing House PVT Ltd, New Delhi.
3. R. Gurdeep, Chatwal and Sham K. Aanand. (2006). Instrumental Methods of Chemical Analysis, Himalaya publishing House, New Delhi.
4. David Freifelder (1976)., Physical biochemistry, applications to biochemistry and molecular biology, second edition. W.H.Freeman & Co Ltd.
5. M.L Srivastava (2008)., Bioanalytical Techniques., Narosa, Chennai.

Semester-III

Sub. Code: PBC302

MAIN PRACTICAL-III

3 Hours/3 Credits

I. Preparation

a).Preparation of Buffer

1. Phosphate buffer
2. Tris buffer
3. Citrate buffer.

b).Solution preparation

1. Normality and Molarity solution
2. Saturated solution, Percentage solution, Sucrose gradient solution and dilute solution.

II. Techniques

a).Colorimetry

1. Estimation of Amino acids by Ninhydrin method.
2. Estimation of Protein by Biuret method.
3. Estimation of Protein by Lowry's method.
4. Estimation of Phosphorus by Fiske and Subbarow method.

Semester-IV

Sub. Code: BC408

ANALYTICAL BIOCHEMISTRY

4 Hours/4 Credits

Course Objectives:

- To learn the basic knowledge of centrifugation and its applications.
- To study the working principle of chromatography.
- To understand the principle and instrumentation of electromagnetic radiation.
- To learn the principle, instrumentation and applications of colorimeter.
- To understand the basic mechanism and applications of radioisotopes.

Course outcomes:

S.No.	Description	Cognitive Level (K-level)
CO-1	Understand the basic knowledge on centrifugation and its applications	K2
CO-2	Acquire the basic knowledge on different types of centrifuges	K3
CO-3	Summarize the principle and application of chromatography	K5
CO-4	Discriminate the Principles, instrumentation and applications of Spectroscopy	K4
CO-5	List out the types and applications of electrophoresis	K1
CO-6	Integrate the basic mechanism and applications of radioisotopes and radioactivity	K6

UNIT-I: Basic principles-Sedimentation rate, Svedberg unit, different types of rotors. Types of centrifuges, Different types of centrifugation –Analytical and preparative, Differential, density gradient, isopycnic and equilibrium centrifugation and its applications.

UNIT-II: General principles (partition and adsorption), instrumentation and Applications of chromatography–Paper Chromatography, Thin layer chromatography, Affinity Chromatography, Ion Exchange Chromatography, Gel filtration chromatography, Gas Liquid chromatography and HPLC.

UNIT-III: General principles, factors affecting the migration rate-sample, electric field, buffer and supporting medium. Paper electrophoresis, Tiselius moving boundary electrophoresis, Agarose gel electrophoresis, SDS-PAGE and Immunoelectrophoresis.

UNIT-IV: Basic principles of electromagnetic radiation. Energy, wavelength, wave number and frequency. Absorption and emission spectra. Beer–Lambert’s law, light absorption and its transmittance. Principles, instrumentation and applications–Colorimeter, UV-visible, Flame Emission and Atomic Absorption Spectrophotometer.

UNIT-V: Atomic structure, radiation, types of radioactive decay, half-life, and units of radioactivity (Roentgen, Rad, Rem, Let). Detection and measurement of radioactivity–methods based upon ionization (GM counter), methods based upon excitation (Liquid and solid scintillation counter), Autoradiography, Applications of radioisotopes, Radiation hazards and safety measures.

Text Books:

1. P. Asokan (2001), Analytical Biochemistry. Chinnaa Publications.
2. M K. Wilson and J. Walker (2006), Practical Biochemistry–Principles and techniques of Biochemistry and Molecular Biology, sixth Edition, Cambridge University Press, New York, USA.

References:

1. A. Upadhyay, K. Upadhyay and N. Nath (2007), Biophysical chemistry, Third revised edition, Himalaya publishing House, Mumbai.
2. Vasantha Pattabhi and Gautham, (2002), Biophysics, second reprint 2005. Narosa Publishing House PVT Ltd, New Delhi.
3. R. Gurdeep, Chatwal and Sham K. Aanand. (2006). Instrumental Methods of Chemical Analysis, Himalaya publishing House, New Delhi.
4. David Freifelder., (1976), Physical biochemistry, applications to biochemistry and molecular biology, second edition. W.H.Freeman & Co Ltd.

Semester-IV**Sub. Code: PBC405****MAIN PRACTICAL-IV****3 Hours/3 Credits****I. Electrophoresis**

1. Separation of serum protein by SDS-PAGE
2. Separation of DNA by Agarose gel electrophoresis.

II. Chromatography

1. Paper chromatographic separation and detection of amino acids
2. Separation of carbohydrates and amino acids by TLC

III. Microbiology

1. Preparation of liquid and solid media.
2. Isolation of bacteria from Air, soil and water.
3. Isolation and maintenance of organisms by plating and streaking methods.
Slants and swab culture.
4. Gram's staining method.
5. Antibiotic sensitivity test