



University of Madras

Chepauk, Chennai 600 005

[Est.1857, State University, NAAC 'A⁺⁺' Grade, CGPA 3.59, NIRF2019 Rank: 20]
website: www.unom.ac.in, Tel.:044-25399561

Undergraduate Programme

Curriculum and Syllabus for

B.Sc. Biochemistry

(With effect from the Academic Year 2023-24)

JUNE 2023

Note: The Board of Studies in Biochemistry (Common) designed the syllabus as per Common Model Syllabus provided by TANSCHÉ based on Learning Outcome based Curriculum Framework (LOCF) as prescribed by the UGC.

INDEX

Contents	Page No.
Preamble	
TANSCHÉ regulations on learning outcomes	
Program Outcomes	
Program specific outcomes	
Highlights of the Revamped Curriculum	
Value additions in the Revamped Curriculum	
Template for Curriculum Design for UG Programme in Biochemistry	
Credit Distribution for UG Programme in Biochemistry	
Consolidated Semester wise and Component wise Credit distribution	
Illustration for B.Sc. Biochemistry Curriculum Design	
Suggestive Topics in Core Component	
Suggestive Topics in Elective Courses (Generic / Discipline-centric)- Group I	
Suggestive Topics in Elective Courses (Discipline-centric) Group II	
Suggestive Topics in Skill Enhancement Courses (SEC)- Group III	
Scheme of Semester B.Sc. Program	
Skill Enhancement courses (NME)	
Skill Enhancement courses (Discipline/Sub/Entrepreneurial)	
Elective (Offered by Biochemistry)	

THE REGULATIONS ON LEARNING OUTCOMES BASED CURRICULUM FRAME WORK FOR UNDERGRADUATE EDUCATION

1. Preamble

Biochemistry is the cross over scientific discipline that integrates the living world and chemistry. It involves the study of the structure of biomolecules and explores the biological processes at molecular level in the living organisms. It is the laboratory science that has several domains like cell biology, molecular biology, clinical biology, enzymology, immunology, physiology, pharmacology etc., It has enlightened many aspects of health and diseases and paved the way for many interdisciplinary technological innovations like metabolomics, genomics and proteomics. There is a continuous demand for biochemists in public and private health care sectors, agriculture, medical and forensic departments. Almost all food, pharmaceuticals, health and beauty care etc required quality control and safety checks for which experts in the field of Biochemistry are always in need. The syllabi for the three year B.Sc., degree programme in Biochemistry was framed in such a way that at the end of the course they could apply the knowledge and expertise in industries, diagnostic laboratories and various research fields

The programme endeavours to provide students a broad based training in biochemistry with a solid background of basic concepts as well as exposing them to the exciting advancements in the field. In addition to theoretical knowledge, significant emphasis has been given to provide hands on experience to the students in the forefront areas of experimental biochemistry. A multidisciplinary approach has been employed to provide the best leverage to students to enable them to move into frontier areas of biological research in the future.

The course defines clearly the objectives and the learning outcomes, enabling students to choose the elective subjects for broadening their skills. The course also offers skills to pursue research in the field of Biological Chemistry and thus would produce best minds to meet the demands of society.

Biochemistry, today is considered as an application oriented integrated basic science. It's an interdisciplinary science that has emerged by the confluence of principles of Chemistry, Physics and Mathematics to Biology. Advances in Biochemistry have immense positive implications on the understanding of biochemical interactions, cellular communications, hormonal mechanisms and the cross talks between them. The research in Biochemistry has been translational and there is a shift from hypothesis driven research to data dependent research that promises translational, product oriented research. Much of the advancement in Biochemistry is in the advancement of Biotechnology, as a basic science discipline Biochemistry led to Biotechnological advancement.

Considering its pivotal role in biological sciences, it is imperative to strengthen the fundamental concepts of Biochemistry.

TANSICHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE EDUCATION	
Programme:	B.Sc. Biochemistry
Programme Code:	
Duration:	3 years [UG]
Programme Outcomes:	PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the

	interests of a common cause and work efficiently as a member of a team PO8: Scientific reasoning: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
Programme Specific Outcomes:	PSO1 – Placement: To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. PSO 2 - Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations

	PSO3 – Research and Development: Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. PSO4 – Contribution to Business World: To produce employable, ethical and innovative professionals to sustain in the dynamic business world. PSO 5 – Contribution to the Society: To contribute to the development of the society by collaborating with stakeholders for mutual benefit
--	--

PROGRAM OUTCOMES

PO1	Acquire knowledge in Biochemistry and apply the knowledge in their day to day life for betterment of self and society
PO2	Develop critical, analytical thinking and problem solving skills
PO3	Develop research related skills in defining the problem, formulate and test the hypothesis, analyse, interpret and draw conclusion from data
PO4	Address and develop solutions for societal and environmental needs of local, regional and national development
PO5	Work independently and engage in lifelong learning and enduring proficient progress
PO6	Provoke employability and entrepreneurship among students along with ethics and communication skills

PROGRAM SPECIFIC OUTCOMES

PSO1	Comprehend the knowledge in the biochemical, analytical, biostatistical and computational areas
PSO2	Ability to understand the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by human kind
PSO3	Acquiring analytical and hands on skills to perform research in multidisciplinary environments
PSO4	Use library search tools and online databases and sources to locate and retrieve scientific information about a topic and techniques related to biochemistry

Eligibility for admission

Candidate for admission to the first year of B.Sc. Degree Course in Bio-Chemistry shall be required to have passed the Higher Secondary Examination with Chemistry and Biology or Chemistry, Botany and Zoology or Biochemistry and Chemistry.

3.Highlights of the Revamped Curriculum

- The curriculum is created to improve the relationship between business and academia
- Every semester, practical based on the course taken that semester will aid students in applying what they have learned
- Students will benefit from the introduction of skill based elective courses including Bioinformatics, Nanobiotechnology, Therapeutic nutrition, and Medical Laboratory technology as they keep up with technological advancements in their fields of study
- The fourth semester internship will give students a chance to apply what they have learned in class to a real world working experiment
- Skill enhancement courses help students venture new platforms in career.
- Equip students with employability skills, generate self employment and small scale entrepreneurs.

4.Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	Foundation Course It depicts the overview of entry education and makes the students assimilate with the biochemistry course. This course will inculcate knowledge of the academic skills, laboratory skills and research	It gives a strong determination to undergo the course. Be committed and interested in learning the subject
I, II, III, IV	Skill Enhancement papers (Discipline centric/ Generic/ Entrepreneurial)	Improve employability Develop the skill as Laboratory Analyst To make students compete with industrial expectations.
		Incorporating the interest on health, diet, lifestyle

		diseases will enable the students gain knowledge to get exposed themselves in medical field
		Biomedical Instrumentation skills will aid the students gain knowledge on the various instruments used in the field of medical laboratory and research.
		Entrepreneurial skill training will increase the chance to build their career independently. Learning this skills will encourage the students to enhance creativity, innovation and collaboration
		Discipline /subject specific skill will serve as a route for employability
V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	It reinforces additional knowledge inputs along with core course. Students are familiarized with multi-disciplinary, cross disciplinary and inter disciplinary subjects. It broadens the knowledge on immunological aspects, pharmacology and research. Additional Employability skills are facilitated through computational biology and Bio-entrepreneurship.
V semester Vacation activity	Internship/ Industrial visit/Field visit	Hand on training in Medical Labs/ Industry/ Research centres enable the students to explore the practical aspects in career path. They gain confident to fix their career.
VI Semester	Project with Viva – voce	Self-learning is enhanced· It serves as a platform to express their innovative ideas in a practical way, which serves as a pathway to enter in the field of research.
VI Semester	Introduction of Professional Competency skill	The revamped curriculum caters the education to all category of learners; Learning multidisciplinary papers, updated in the curriculum will help the students to fix their career in the fields of Medical, pharmaceutical, forensic, nutritional, diagnostic coding ,etc ·Students are trained in the field of research to bring out the progress in the field of Medical, Agriculture ,Nutrition ,etc which will be a back bone for health and wealth creation and improve the quality of life
Extra Credits: For Advanced Learners / Honours degree		ETo cater to the needs of peer learners / research aspirants

Skills acquired from the Courses	Analytical, Laboratory operating, Predicting, Experimenting, Critical thinking, Problem solving, Communication, Interpersonal, Time management and Multi-tasking Skills
---	---

Credit Distribution for UG Programmes

[illegible]

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System
for all UG courses including Lab Hours**

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	30

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-2	2	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
		23	30

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	-	1
		22	30

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	13
Part-4	Skill Enhancement Course -SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course -SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	30

**Third Year
Semester-V**

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based	22	28
Part-4	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	-
		26	30

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based & LAB	18	28
Part-4	Extension Activity	1	-
	Professional Competency Skill	2	2
		21	30

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	26	21	140

***Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, Solve problems, Observe, Explain	
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate	
	Between various ideas, Map knowledge	
Evaluate(K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

8. Illustration for B.Sc. Biochemistry Curriculum Design

First Year Semester-I

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-I	Language –Tamil	3	6
Part-II	English	3	6
Part-III	Nutritional Biochemistry (Core Course - I)	5	5
	Practical I – Nutritional Biochemistry (Core Course - II)	5	5
	Chemistry I (Elective)	2	4/6*
	Chemistry Practical (Elective)	1 [#]	
Part-IV	Skill Enhancement Course -1 (Non-Major Elective)	2	2
	Foundation Course FC Bridge course	2	2
		23	30

Semester-II

Part	List of Courses	Credit	Hours per week(L/T/P)
Part-I	Language - Tamil	3	6
Part-II	English	3	6
Part-III	Cell Biology (Core Course - III)	5	5
	Chemistry- II (Elective)	2	4/6*
	Chemistry Practical (Elective)	1 [#]	
	Practical II -Cell Biology (Core Course - IV)	5	5
Part-IV	Skill Enhancement Course -2 Data Analytic Skills	2	2
	Skill Enhancement Course-3 (Discipline / Subject Specific) – Computational Mathematics	2	2
		23	30

Second Year: Semester-III

Part	List of Courses	Credit	Hours per week(L/T/P)
Part-I	Language -Tamil	3	6
Part-II	English	3	6
Part-III	Biomolecules (Core Course - V)	5	5
	Practical III Biomolecules (Core Course - VI)	5	5
	Elective Paper III	2	4/6*
	Elective Practical	1 [#]	
Part-IV	Skill Enhancement Course-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5	2	2
	Environmental Studies	-	1
		22	30

Second Year: Semester-IV

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-I	Language - Tamil	3	6
Part-II	English	3	6
Part-III	Biochemical techniques (Core Course - VII)	5	5
	Practical IV -Biochemical Techniques (Core Course - VIII)	5	5
	Elective Paper IV	2	3/6*
	Elective Practical	1 [#]	
Part-IV	Skill Enhancement Course -6	2	2
	Skill Enhancement Course - 7	2	2
	Environmental Studies	2	1
		25	30

Third Year: Semester-V

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Enzymes (Core Course - IX)	4	5
	Intermediary Metabolism (Core Course - X)	4	5
	Clinical Biochemistry (Core Course - XI)	4	5
	Practical V -Clinical Biochemistry (Core Course - XII)	4	5
	Elective Paper V	3	4
	Elective Paper VI	3	4
Part-IV	Value Education	2	2
	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	2	
		26	30

Third Year: Semester-VI

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Molecular Biology (Core Course - XIII)	4	6
	Human Physiology (Core Course - XIV)	4	6
	Project (Core Course - XV)	4	6
	Elective paper VII Biotechnology/ Bioinformatics/Bio-Entrepreneurship	3	5
	Elective paper VIII - Plant Biochemistry and Plant Therapeutics	3	5
Part-IV	Professional Competency Skill	2	2
Part -V	Extension Activity	1	-
		21	30

Total Credits: 140

* To be adjusted internally. If electives without practical is opted, 3 credits will be awarded for theory

Examination will be conducted at the end of the academic year

9. Suggestive Topics in Core Component

- Nutritional Biochemistry
- Cell Biology
- Biomolecules
- Biochemical techniques
- Enzymes
- Intermediary metabolism
- Clinical Biochemistry
- Molecular Biology
- Human Physiology

10. Suggestive Topics in skill enhancement courses (NME))

- Medicinal Diet
- Lifestyle Diseases
- Health and Nutrition

11. Suggestive Elective Courses (Discipline-centric)

I year - Chemistry (I and II Semesters)

II year - Microbiology/Zoology/Botany/Biotechnology/Biostatistics (III and IV Semesters)

III year – Elective papers

- Immunology
- Biochemical pharmacology
- Research methodology
- Bio-entrepreneurship
- Bioinformatics
- Biotechnology
- Plant Biochemistry and Plant therapeutics

12. Suggestive Topics in Skill Enhancement Courses (SEC)

- Biomedical Instrumentation
- First Aid
- Basics of forensic science
- Medical Laboratory technology
- Tissue culture
- Medical coding
- Microbial techniques

FIRST YEAR: SEMESTER I

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-I	2	1	0	0	3	6	25	75	100
II	Language	100L1Z: English-I	2	1	0	0	3	6	25	75	100
III	CC-I	122C1A: Nutritional Biochemistry	3	2	0	0	5	5	25	75	100
	CC-II	122C11: Nutritional Biochemistry Practical-I	0	0	5	0	5	5	40	60	100
	EC-I	122E1A: Chemistry for Biological Science – I	1	1	0	0	2	2	25	75	100
	EP-I	122E11: Chemistry Practical for Physical and Biological Science – I	0	0	1	0	-	2	Examination conduct in II Semester		
IV	SEC-1	(Any one) 122S1A: Health and Nutrition 122S1B: Lifestyle Diseases 122S1C: Medicinal Diet	1	1	0	0	2	2	25	75	100
	FC	122B1A: Basics Of Biochemistry For Beginners – Scope & Applications	1	1	0	0	2	2	25	75	100
Total							23	30			

FIRST YEAR: SEMESTER II

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-II	2	1	0	0	3	6	25	75	100
II	Language	100L2Z: English-II	2	1	0	0	3	6	25	75	100
III	CC 3	122C2A: Cell Biology	3	2	0	0	5	5	25	75	100
	CC 4	122C21: Cell Biology Practical-II	0	0	5	0	5	5	40	60	100
	EC 2	122E2A: Chemistry for Biological Science – II	1	1	0	0	2	2	25	75	100
	EP 2	122E21: Chemistry Practical for Physical and Biological Sciences – I & II	0	0	1	0	1	2*	40	60	100
IV	SEC-2	122S2A: Choose from the list%	1	1	0	0	2	2	25	75	100
	SEC-3	122S2B: Choose from the list%	1	1	0	0	2	2	25	75	100
Total							23	30			

Skill Enhancement Course (NME / Discipline / Sub Specific) – (Basket of Courses)

SECOND YEAR: SEMESTER III

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-III	2	1	0	0	3	6	25	75	100
II	Language	200L3Z: English–III	2	1	0	0	3	6	25	75	100
III	CC 5	222C3A: Biomolecules	3	2	0	0	5	5	25	75	100
	CC 6	222C31: Biomolecules - (Core Practical-III)	0	0	5	0	5	5	40	60	100
	EC 3	(CHOOSE ANY ONE) 222E3A:Elective: Botany – I (Theory) 222E3B: Elective Zoology – I (Theory) 222E3C: Elective Biotechnology – I (Theory)	1	1	0	0	2	2	25	75	100
		222E3D: Elective Microbiology – I 222E3E: Elective Biostatistics – I	2	1	0	0	3	4	25	75	100
		CHOOSE ANY RELEVANT ONE Elective Botany – I (Practical) Elective Zoology- I (Practical) Elective Biotechnology – I (Practical)	0	0	0	0	-	2	-	-	-
IV	SEC-4	222S3A: Choose from the list%	1	0	0	0	1	1	25	75	100
	SEC-5	222S3B: Choose from the list%	1	1	0	0	2	2	25	75	100
	Environmental Studies						-	1	25	75	100
Total							24	34			

SECOND YEAR: SEMESTER IV

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-IV	2	1	0	0	3	6	25	75	100
II	Language	200L4Z: English–IV	2	1	0	0	3	6	25	75	100
III	CC 7	222C4A: Biochemical techniques	3	2	0	0	5	5	25	75	100
	CC 8	222C41: Biochemical Techniques (CORE Practical-IV)	0	0	5	0	5	5	40	60	100
	EC4 - Elective	(CHOOSE ANY ONE) 222E4A: Elective Botany – II (Theory) 222E4B: Elective Zoology II (Theory) 222E4C: Elective Biotechnology II (Theory)	1	1	0	0	2	2	25	75	100
		222E4D: Elective Microbiology – II 222E4E: Elective Biostatistics –II	2	1	0	0	3	3	25	75	100
		CHOOSE ANY RELEVANT ONE 222E41: Elective Botany – I & II (Practical) 222E42:Elective Zoology I & II (Practical) 222E43Elective Biotechnology –I &II (Practical)	0	0	1	0	2	1	40	60	100
IV	SEC-6	222S4A: Choose from the list%	1	1	0	0	2	2	25	75	100
	SEC-7	222S4B: Choose from the list%	1	1	0	0	2	2	25	75	100
	222V4A: Environmental Studies		1	1	0	0	2	1	25	75	100
Total							29	33			

THIRD YEAR: SEMESTER V

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
III	CC 9	322C5A: Enzymes	3	1	0	0	4	5	25	75	100
	CC 10	322C5B: Intermediary Metabolism	3	1	0	0	4	5	25	75	100
	CC 11	322C5C: Clinical Biochemistry	3	1	0	0	4	5	25	75	100
	EC 5	322E5A: Immunology	2	1	0	0	3	4	25	75	100
	EC 6	322E5B: Biochemical Pharmacology OR 322E5C: Research Methodology	2	1	0	0	3	4	25	75	100
	CC 12	322C51: Clinical Biochemistry Practical-V	0	0	4	0	4	5	40	60	100
IV	322V5A: Value Education		1	1	0	0	2	2	25	75	100
	322V5B: Internship/ Industrial visit/Field visit		0	1	1	0	2		25	75	100
Total							26	30			

THIRD YEAR: SEMESTER VI

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
III	CC 13	322C6A: Molecular Biology	3	1	0	0	4	6	25	75	100
	CC 14	322C6B: Human Physiology	3	1	0	0	4	6	25	75	100
	CC 15	322C61: Project	0	0	4	0	4	6	40	60	100
	EC 7	322E6A: Biotechnology (or) 322E6B: Bioinformatics (or) 322E6C: Bioentrepreneurs	2	1	0	0	3	5	25	75	100
	EC 8	322E6D: Plant Biochemistry and Plant Therapeutics	1	2	0	0	3	5	25	75	100
1V	SEPC	322S6A: Professional Competency Skill					2	2			
V	322V6A: Extension Activity						1				
Total							21	30			

Remarks: English Soft Skill - **2 hours** will be handled by English Teachers. (4+2=6)

%Skill Enhancement Courses (SEC)

22SEC1	Basics of Forensic Science
22SEC2	Biomedical Instrumentation
22SEC3	First Aid
22SEC4	Medical Coding
22SEC5	Medical Laboratory Technology
22SEC6	Microbial Techniques
22SEC7	Tissue Culture