

# **KUMARAGURU COLLEGE OF TECHNOLOGY,**

An autonomous Institution affiliated to Anna University, Chennai

**COIMBATORE – 641 049.**

## **B.Tech., BIOTECHNOLOGY REGULATION 2024**



**CURRICULUM AND SYLLABI**

**I to VIII Semesters**

**Department of Biotechnology**

## DEPARTMENT VISION

Strong teaching and research foundation in the area of biotechnology and allied fields through knowledge dissemination to students and to scale new heights in the frontier areas of health, food, and environment and ethics for welfare of humankind.

## DEPARTMENT MISSION

- M1** : Develop dynamic curriculum and syllabus to promote innovative and creative
- M2** : Encourage students for innovation and setting start-ups and equip leadership
- M3** : Train students on issues related to social welfare.
- M4** : Groom students to uphold professional and leadership qualities

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**The program educational objective of B Tech Biotechnology program are:**

- PEO1** : Graduates will build successful careers in biotechnology and related fields, working well in diverse and multidisciplinary teams.
- PEO2** : Graduates will pursue higher studies and research by combining biological and engineering knowledge.
- PEO3** : Graduates will follow ethical practices and contribute to the well-being of mankind and the environment.

## PROGRAM OUTCOMES (POs)

Graduates of the Biotechnology undergraduate Program in B. Tech Biotechnology should have the ability to:

- PO1** : **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

- PO2** : **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3** : **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4** : **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5** : **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6** : **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7** : **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8** : **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9** : **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10** : **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11** : **Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

## PROGRAM SPECIFIC OUTCOMES (PSOs)

The Program Specific Outcomes of Biotechnology Undergraduate Program in B Tech Biotechnology is to prepare the graduates

- PSO1** : Apply fundamental biological principles to provide sustainable solutions for broad biotechnology sectors.
- PSO2** : Apply bioprocess principles and biological data-driven approaches to develop the processes and products for health, agriculture, food, and environmental systems.

**BIOTECHNOLOGY  
REGULATION 2024  
B.Tech., Biotechnology  
CURRICULUM**

**SEMESTER I**

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HST101	Heritage of Tamil	Theory	HS	1	0	0	0	1
2	24MAI112	Computational Linear Algebra and Calculus	Embedded	BS	3	0	2	0	4
3	24CYI103	Foundations of Chemistry for Biotechnology	Embedded	BS	3	0	2	0	4
4	24BTT101	Concepts of Biology	Theory	BS	2	0	0	0	2
5	24ADP001	Basics of AI	Practical	ES	0	0	2	0	1
6	24BTT102	Bioprocess Calculations	Theory	ES	3	0	0	0	3
7	24INP102	Innovation Practicum - 1	Practical	ES	0	0	2	0	1
8	24MEI103	Computer-Aided Engineering Graphics	Embedded	ES	2	0	2	0	3
9	24HSP111	Holistic Wellness- I	Practical	HS	0	0	2	0	1
10	24INP101	Design Thinking	Practical	HS	0	0	2	0	1
11	24INO--	FCLF -General Stack - 1	Practical	OE	0	0	2	0	1
<b>Total Credits</b>									<b>22</b>
<b>Total Contact Hours/week</b>									<b>30</b>

**SEMESTER II**

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HST102	Tamil and Technology	Theory	HS	1	0	0	0	1
2	24HST103	Effective Communication	Theory	HS	2	0	0	0	2
	24HST104	Professional Communication	Theory	HS	2	0	0	0	
	24HSJ102	Fluency through Practice	Project	HS	0	0	0	4	
3	24MAI122	Advanced Computational Calculus	Embedded	BS	3	0	2	0	4
4	24PHI105	Foundational Physics for Biotechnology	Embedded	BS	3	0	2	0	4
5	24BTI103	Biochemistry and Cellular Energetics	Embedded	BS	3	0	2	0	4
6	24BTT104	Cell Biology	Theory	PC	3	0	0	0	3

7	24INP103	Innovation Practicum - 2	Practical	ES	0	0	2	0	1
8	24CSI101	Logical thinking and Problem Solving	Embedded	ES	3	0	2	0	4
9	24HSP112	Holistic Wellness- II	Practical	HS	0	0	2	0	1
10	24INO1--	FCLF-General Stack - 2	Practical	OE	0	0	2	0	1
<b>Total Credits</b>									<b>25</b>
<b>Total Contact Hours/week</b>									<b>32</b>

### SEMESTER III

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HSP005	Mastering Conversations	Practical	HS	0	0	2	0	1
2	24MAI232	Applied Statistics for Engineers	Embedded	BS	3	0	2	0	4
3	24BTI201	Fundamentals of Microbiology and Immunology	Embedded	PC	3	0	2	0	4
4	24BTT202	Molecular Biology	Theory	PC	3	0	0	0	3
5	24BTT203	Bioanalytical Techniques and Instrumentation	Theory	PC	3	0	0	0	3
6	24BTP204	Cell and Molecular Biology Laboratory	Practical	PC	0	0	4	0	2
7	24INP201	Innovation Practicum - 3	Practical	ES	0	0	2	0	1
8	24BTJ205	Internship - I	Project*	Intern	0	0	0	2	1
9	24INM201	Universal Human Values II: Understanding Harmony	Theory	HS	1	0	0	0	1
10	24INO---	FCLF General stack – 3	Practical	OE	0	0	2	0	1
<b>Total Credits</b>									<b>21</b>
<b>Total Contact Hours/week</b>									<b>29</b>

\* Student can carry out an approved mini project instead of Internship

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SEMESTER IV									
S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HSP006	Mastering Group Discussion and Presentation Skills	Practical	HS	0	0	2	0	1
2	24BTI206	Cell Culture Techniques	Embedded	PC	2	0	4	0	4
3	24BTI207	Genetic Engineering	Embedded	PC	2	0	4	0	4
4	24BTI208	Protein Science and Enzyme Technology	Embedded	PC	2	0	2	0	3
5	24BTI209	Bioprocess Engineering Principles	Embedded	PC	3	0	2	0	4
6	24BTI210	Environmental Biotechnology and Sustainability	Embedded	PC	1	0	0	2	2

7	24INO--	FCLF Technical Stack - 1	Practical	OE	0	0	2	0	1
8	24INO--	FCLF Emerging Technology Stack - 1	Practical	OE	0	0	2	0	1
9	24INP202	Innovation Practicum - 4	Practical	ES	0	0	2	0	1
10	24INM102	Indian Knowledge Systems in Science and Engineering	Mandatory	HS	1	0	0	0	1
<b>Total Credits</b>									<b>22</b>
<b>Total Contact Hours/week</b>									<b>33</b>

### SEMESTER V

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HSP007	Building Professional Readiness	Practical	HS	0	0	2	0	1
2	24BTI301	Upstream Bioprocessing	Embedded	PC	3	0	2	0	4
3	24BTI302	Bioinformatics	Embedded	PC	3	0	2	0	4
4	24BTI303	Immunotechnology	Embedded	PC	2	0	2	0	3
5	24BTE--	Professional Elective – I	Theory	PE	3	0	0	0	3
6	24BTE--	Professional Elective - II	Theory	PE	3	0	0	0	3
7	24BTJ304	Internship-II	Project*	Intern	0	0	4	0	2
8	24BTT305	Core Competencies in Biotechnology	Mandatory	PC	0	1	0	0	0
9	24INO--	FCLF Technical Stack - 2	Practical	OE	0	0	2	0	1
10	24INO--	FCLF Emerging Technology Stack - 2	Practical	OE	0	0	2	0	1
<b>Total Credits</b>									<b>22</b>
<b>Total Contact Hours/week</b>									<b>32</b>

\* Student can carry out an approved mini-project instead of Internship -II

### SEMESTER VI

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24BTI306	Downstream Processing	Embedded	PC	3	0	2	0	4
2	24BTI307	Biostatistics and Experimental Design	Embedded	PC	1	0	2	0	2
3	24BTI308	Integrative Human Physiology	Theory	PC	3	0	0	0	3
4	24BTE--	Professional Elective -III	Theory	PE	3	0	0	0	3

5	24BTE--	Professional Elective -IV	Theory	PE	3	0	0	0	3
6		Language Elective	Embedded	HS	1	0	2	0	2
7	24INO--	FCLF Technical Stack - 3	Practical	OE	0	0	2	0	1
8	24INO--	FCLF emerging Technology stack - 3	Practical	OE	0	0	2	0	1
9		Indian Constitution	Mandatory	MC	1	0	0	0	1
10	24BTJ309	Scientific Communication and Technical Writing	Project	PRJ	0	0	0	2	1
<b>Total Credits</b>									<b>24</b>
<b>Total Contact Hours/week</b>									<b>30</b>

### SEMESTER VII

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24BTT401	Drug Development and Regulatory Affairs	Theory	PC	3	0	0	0	3
2	24BTT402	Bio-Entrepreneurship and Innovation	Theory	HS	3	0	0	0	3
3	24BTE	Professional Elective -V	Theory	PE	3	0	0	0	3
4	24BTE	Professional Elective -VI	Theory	PE	3	0	0	0	3
5	24BTE	Professional Elective -VII	Theory	PE	3	0	0	0	3
6	24BTJ404	Project Phase-I	Project	PRJ	0	0	0	6	3
<b>Total Credits</b>									<b>18</b>
<b>Total Contact Hours/week</b>									<b>21</b>

### SEMESTER VIII

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24BTJ405	Capstone Project Phase - II	Project	PRJ	0	0	0	24	12
<b>Total Credits</b>									<b>12</b>
<b>Total Contact Hours/week</b>									<b>24</b>

## SUMMARY OF SEMESTER WISE CREDITS AND DISTRIBUTIONS

Table :01

Semester	COURSE TYPE AND OVERALL CREDITS									Sem Wise
	HS	BS	ES	PC	PE	OE	Intern	PRJ	MC	
1	3	10	8	-	-	1	-	-	-	22
2	4	12	5	3	-	1	-	-	-	25
3	2	4	1	12	-	1	1	-	-	21
4	2	-	1	17	-	2	-	-	-	22
5	1	-	-	11	6	2	2	-	-	22
6	2	-	-	10	6	2	-	1	1	24
7	3	-	-	3	9	-	-	3	-	18
8	-	-	-	-	-	-	-	12	-	12
<b>Total</b>	<b>17</b>	<b>26</b>	<b>15</b>	<b>56</b>	<b>21</b>	<b>09</b>	<b>03</b>	<b>16</b>	<b>1</b>	<b>163</b>

Table: 02

Course Type	SEMESTER WISE CREDIT DISTRIBUTION								Semester wise Credits	
	1	2	3	4	5	6	7	8		
HS	3	4	02	2	1	2	3	-	17	
BS	10	12	04	-	-	-	-	-	26	
ES	08	05	01	1	-	-	-	-	15	
PC	-	03	12	17	11	10	3	-	56	
PE	-	-	-	-	6	6	9	-	21	
OE	1	1	1	2	2	2	-	-	09	
INTERN	-	-	1	-	2	-	-	-	03	
PRJ	-	-	-	-	-	-	4	12	16	
MANDAT	-	-	-	-	-	1	-	-	01	
<b>Total</b>	<b>22</b>	<b>25</b>	<b>21</b>	<b>22</b>	<b>22</b>	<b>21</b>	<b>18</b>	<b>12</b>	<b>163</b>	
<b>AY</b>	<b>47</b>		<b>43</b>			<b>43</b>		<b>30</b>		