

## B.E. – BIOTECHNOLOGY (170 Credits)

Yr.	ODD SEMESTER					EVEN SEMESTER						
	Sub Code	Subject Name	L	T	P	Sub Code	Subject Name	L	T	P	C	
<b>II YEAR</b>	MAT-2107	Mathematics III	3	0	0	MAT 2207	Mathematics IV	3	0	0	3	
	BIO 2101	Cell and Molecular Biology	3	0	0	BIO 2201	Chemical & Biochemical Engg. Thermodynamics	3	1	0	4	
	BIO 2102	Process Biochemistry	4	0	0	BIO 2203	Genetic engineering	3	0	0	3	
	BIO 2103	Industrial Microbiology	3	0	0	BIO 2204	Downstream Processing in Biotechnology	3	1	0	4	
	BIO 2104	Bioprocess Calculations	3	1	0	BIO 2205	Heat & Mass Transfer operations in Bioprocessing	3	1	0	4	
	BIO 2106	Fluid flow operations in Bioprocessing	3	1	0	****	Open Elective I	3	0	0	3	
	BIO 2108	Biochemistry Lab	0	0	3	BIO 2208	Molecular Biology & Genetic Engineering Lab	0	0	3	1	
	BIO 2109	Microbiology Lab	0	0	3	BIO 2209	Unit Operations Lab	0	0	3	1	
		<b>Total</b>	<b>19</b>	<b>2</b>	<b>6</b>		<b>Total</b>	<b>21</b>	<b>3</b>	<b>6</b>	<b>23</b>	
		BIO 3101	Animal , Plant Biotechnology & Bioethics	4	0	0	HSS ****	Essentials of Management / Economics and Finance	3	0	0	3
<b>III YEAR</b>	BIO 3102	Bioprocess Engineering	3	1	0	BIO 3201	Bioinformatics	3	1	0	4	
	BIO 3103	Separation techniques in Biotechnology	3	1	0	BIO ****	Program elective-II	3	0	0	3	
	BIO ****	Program Elective-1	3	0	0	BIO 3202	Bioprocess Equipment Design	3	1	0	4	
	BIO 3104	Bio-Reaction Engineering	3	1	0	BIO ****	Program Elective- III	3	0	0	3	
	BIO 3108	Downstream Processing Lab	0	0	3	****	Open Elective	3	0	0	3	
	BIO 3109	Bioprocess Engineering lab	0	0	3	BIO 3208	Bioinformatics Lab	0	1	3	2	
		<b>Total</b>	<b>18</b>	<b>3</b>	<b>6</b>		<b>Total</b>	<b>18</b>	<b>1</b>	<b>6</b>	<b>23</b>	
		HSS****	Economics and Finance /Essentials of management	3	0	0	BIO 4201	Industrial Training/ Tour	0	0	0	1
	BIO 4102	Bioprocess Control	3	1	0	BIO 4202	Project Work/ Practice School	0	0	0	12	
	BIO 4103	Biostatistics & analytical techniques	3	0	0							
<b>IV YEAR</b>	BIO ****	Program Elective-IV	3	0	0							
	BIO ****	Program Elective -V	3	0	0							
	BIO ****	Program Elective- VI	3	0	0							
	BIO 4108	Process Control Lab	0	1	3							
	BIO 4109	Modeling and simulation in Bioprocess Engineering Lab	0	1	3							
	BIO 4107	Seminar	0	0	3							
		<b>Total</b>	<b>18</b>	<b>2</b>	<b>9</b>		<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	

BIO 4 110 Immunotechnology	BIO 4104 Biopharmaceutical Engineering	BIO 4107 Drug Delivery: Engineering Principles	BIO 4113 Bioremediation
BIO 4111 Microbial waste water treatment	BIO 4114 Biofuels Engineering	BIO 41145 Genomics & Proteomics	BIO 4119 Solid state fermentation
BIO 4112 Design and development of biological treatment processes	BIO 4119 Advanced Bioprocess Engineering	BIO 4116 protein Engineering	BIO 4118 Solid waste management
BIO 4105 Biomaterials	BIO 4106 Molecular Modeling & Drug design	BIO 4117 Metabolic Engineering	

**OPEN ELECTIVES:** BIO 2210: Introduction to Bioinformatics BIO 3210: introduction to Biofuels & Biopolymers

### Minor degrees:

- **Environmental Biotechnology**

1. Microbial Treatment of wastewater
2. Design of biological treatment processes
3. Solid waste management
4. Bioremediation

- **Pharmaceutical Biotechnology**

1. Biopharmaceutical Engineering
2. Biomaterials
3. Molecular Modeling & Drug design
4. Drug Delivery: Engineering Principles

- **Genetic Engineering**

1. Immunotechnology
2. Genomics and proteomics
3. Protein Engineering
4. Metabolic Engineering