

**DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : **XXX M.Tech. (Biomanufacturing)**
 Department : **Department of Biosciences and Bioengineering**
 Year : **I**
 Model : **2**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	BEC-501	Reaction Engineering in Bioprocesses	PCC	4	3	1	0	3	0
2.	BEC-503	Unit Operations in Biomanufacturing	PCC	4	3	1	0	3	0
3.	BEC-505	Plant Design and Technoeconomic Analysis	PCC	4	3	1	0	3	0
4.	BEC-507	Biomanufacturing Lab	PCC	3	0	0	6	0	0
5.		Program Elective-I	PEC	4	-	-	-	-	-
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		21					
Semester-II (Spring)									
1.		Program Elective-II	PEC	4	-	-	-	-	-
2.		Program Elective-III	PEC	4	-	-	-	-	-
3.		Program Elective-IV	PEC	4	-	-	-	-	-
4.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
5.	BEC-700	Seminar	SEM	2	-	-	-	-	-
		Total		17					

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Program Code : **XXX M.Tech. (Biomanufacturing)**
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Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	BEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	BEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	BEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	21	17	13	14
Total Credits	65			

M.Tech. (Biomanufacturing)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	BEL-501	Recombinant DNA Technology	PEC	4	3	1	0	3	0
2.	BEL-502	Fluid Mechanics for Biological Engineers	PEC	4	3	1	0	3	0
3.	BEL-503	Mass and Heat Transfer Operation	PEC	4	3	1	0	3	0
4.	BEL-504	Advanced Bioreactor Design	PEC	4	3	1	0	3	0
5.	BEL-505	Biomanufacturing Process Modeling and Simulation	PEC	4	3	1	0	3	0
6.	BEL-506	Computer Aided Design for Bioprocess	PEC	4	3	1	0	3	0
7.	BEL-507	Enzyme Production and Industrial Fermentation	PEC	4	3	1	0	3	0
8.	BEL-508	Biorefinery for Energy and Value-added Products	PEC	4	3	1	0	3	0
9.	BEL-509	Biological Regulatory System and Compliance	PEC	4	3	1	0	3	0
10.	BEL-510	Microbiology and Biochemistry	PEC	4	3	1	0	3	0

Science, Technology, and Advanced Research-tools Basket

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	BET-501	Bioinformatics	STAR	3	2	0	2	3	0