Two-Year MTech program in Bioprocess Engineering

by

Department of Biotechnology
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Name of the program: 2-year MTech program in Bioprocess Engineering

Need for the program:

Bioprocess Engineering is an interdisciplinary area involving principles of both life sciences and engineering. The biochemical and bioprocess industries have continually gained in importance over the last few decades. Advances in bioenergy, biofuel production, metabolic engineering for the production of pharmaceuticals and fine chemicals, commodity and specialty chemicals, recombinant protein production are all contingent on a trained workforce of engineers in the 'bio' industries. Some new start-ups have also been very successful in some of these areas. The Biotechnology Industry Research Assistance Council (BIRAC), Government of India, has also been aggressively pushing for innovation in many of these areas. In addition to industries, development of skilled bioprocess engineers in higher education and research is also very much needed. We seek to address these specific needs of the Biotechnology and Biochemical industries through a rigorous program in Bioprocess Engineering, imparting core engineering principles, coupled with hands-on experience in upstream, reactors and downstream processing. IIT Madras has a substantial number of faculty with a Chemical Engineering background working in the areas of Bioprocess and Biochemical Engineering. A Master's-level program from IIT Madras has the potential to create significant impact.

Potential employers: Biocon, Dr. Reddy's Laboratories, Panacea Biotec, Wockhardt, Bharat Serum and Vaccines, Novozymes, Reliance, Ranbaxy Laboratories, Cadila Pharmaceuticals etc.

Eligibility criteria:

1. B.E/B.Tech in Biotechnology/ Chemical Engineering/ Industrial Biotechnology/ Biochemical Engineering/ Biological Engineering with a GATE score in Biotechnology (BT)/ Chemical Engineering (CH)
2. Any other branch of Engineering with GATE score in Biotechnology (BT)/ Chemical Engineering (CH)/ Life Sciences (XL)
3. Student intake: 15 per year

About the program: 2-year M.Tech Bioprocess Engineering program

1. In M.Tech Bioprocess Engineering program, students will undergo course work for one year (5 core subjects, 1 Lab and 5 electives) and carry out an intensive project in the second year (12 months).
2. At the end of 1st year, the student can appear for a comprehensive examination. Upon successfully clearing this exam, the student can upgrade to a PhD. At the end of the PhD, the student will be awarded both M.Tech and PhD degrees as per the existing institute norms.

MTech Bioprocess Engineering Curriculum (2018 onward)
Total credits: 200

Semester-wise distribution of credits and time commitment

Semester	I*	II*	Sum	III	IV
Credits	33	22	20	40	40
Time commitment per week (based on *recommended*)	51	49	20	40	40

*Credits indicated are only for the core program. In addition to the indicated credits, students have to earn 45 elective credits in the first two semesters, with at least 27 credits from the Department of Biotechnology and the remaining 18 credits from any department including BT.

Recommended: Semester I – 18 credits; II – 27 credits

SEMESTER I

No.	Title	L	T	E	P	O	C	Cat
BT5031	Biochemical Thermodynamics	3	1	0	0	6	10	P
BT5071	Bioreactor Design and Principles	3	1	0	0	6	10	P
BT5051	Transport Phenomena in Biological Systems	3	1	0	0	6	10	P
BT5111	Bioprocess Engineering Laboratory I	0	0	0	3	0	3	P
	TOTAL	**9**	**3**	**0**	**3**	**18**	**33**	

SEMESTER II

No.	Title	L	T	E	P	O	C	Cat
BT5041	Downstream Processing	3	1	0	0	6	10	P
BT5210	Bioprocess Control	3	0	0	0	6	9	P
BT5121	Bioprocess Engineering Laboratory II	0	0	0	3	0	3	P
	TOTAL	**6**	**1**	**0**	**3**	**12**	**22**	

SUMMER

No.	Title	L	T	E	P	O	C	Cat
BT6900	MTech Project	0	0	0	0	20	20	P
	TOTAL	**0**	**0**	**0**	**0**	**20**	**20**	

SEMESTER III

No.	Title	L	T	E	P	O	C	Cat
BT6910	MTech Project	0	0	0	0	40	40	P
	TOTAL	**0**	**0**	**0**	**0**	**40**	**40**	

SEMESTER IV

No.	Title	L	T	E	P	O	C	Cat
BT6920	MTech Project	0	0	0	0	40	40	P
	TOTAL	**0**	**0**	**0**	**0**	**40**	**40**	

Total Credits: 200

List of professional electives

1. BT5370 Fermentation Technology
2. BT5260 Plant Cell Bioprocessing
3. BT5130 Tissue Engineering
4. BT5021 Metabolic Engineering
5. BT5420 Computer Simulations of Biomolecular Systems
6. BT3031 Biosensors and Instrumentation
7. BT5230 Molecular Modeling and Drug Design
8. BT5240 Computational Systems Biology
9. BT5360 Reactive Species in Medical and Related Technologies
10. BT5011 Biomaterials Engineering
11. BT5430 Drug Delivery
12. BT6240 Bioprocess Modeling and Simulation
13. BT6250 Bioprocess Equipment Design
14. BT4210 Unit Operations in Biochemical Engineering
15. BT5040 Advanced Bioprocess Technology

Appropriate courses from other departments, with required approvals