

Biomanufacturing (MR): Industry Track

Degree Requirements

Students must complete a total of 36 credit hours to complete the degree. Students will choose a specialization area in either upstream or downstream. This subplan requires the completion of at least one co-op cycle.

Degrees earned will be distributed as: "Master of Biomanufacturing" without a subplan designation.

Code	Title	Hours	Counts towards
Core Courses			18
BEC 515	Biopharmaceutica Product Characterization Techniques	2	
or BEC 588	Animal Cell Culture Engineering		
BEC 575	Global Regulatory Affairs for Medical Products	3	
BEC 577	Advanced Biomanufacturing and Biocatalysis	3	
BEC 590	Industry Practicum in Biomanufacturing	3	
BEC 601	Biomanufacturing Seminar ¹	1	
BEC 601	Biomanufacturing Seminar	1	
BEC 620	Leadership and Preparation for Industry Internship in Biomanufacturing	2	
ST 511	Statistical Methods For Researchers I	3	
Specialization			6
Students will select an upstream or downstream specialization.			
Upstream Specialization:			
BEC 563	Fermentation of Recombinant Microorganisms	2	
BEC 526	Upstream Biomanufacturing Laboratory	2	
BEC 580	cGMP Fermentation Operations	2	
OR			

Downstream Specialization:

BEC 532	Foundations of Downstream Processing and Formulation ²	2
BEC 536	Introduction to Downstream Process Development	2
BEC 585	cGMP Downstream Operations	2
Cooperative Education Coursework		3
COP 500	Co-Op Work Graduate Alt	3
Professional Courses		6
BUS 554	Project Management	3
Select 3 credit hours from the following choices:		
BUS 501	Strategic Management Foundations	3
MBA 585	Current Topics in BioSciences Management	3
MBA 586	Legal, Regulatory and Ethical Issues in Life Science Industries	3
MBA or BUS or COM 5xx Elective		
Advised Elective		3
BEC 515	Biopharmaceutical Product Characterization Techniques	2
BEC 525	Molecular Biology for Biomanufacturing	2
BEC 526	Upstream Biomanufacturing Laboratory	2
BEC 532	Foundations of Downstream Processing and Formulation ²	2
BEC 536	Introduction to Downstream Process Development	2
BEC 545	Cell Line Development for Biomanufacturing	2
BEC 562	Fundamentals of Bio-Nanotechnology	3

BEC 563	Fermentation of Recombinant Microorganisms	2
BEC 580	cGMP Fermentation Operations	2
BEC 583	Tissue Engineering Technologies	2
BEC 585	cGMP Downstream Operations	2
BEC 588	Animal Cell Culture Engineering	2
BEC 595	Special Topics in Biomanufacturing	1-6
BEC 669	Biomanufacturing Research Projects	1-4
BIT 501	Ethical Issues in Biotechnology	1
BIT 510	Core Technologies in Molecular and Cellular Biology	4
BIT 566	Animal Cell Culture Techniques	2
BEC or BIT or Advised (500-700) Elective		As Needed
Minimum Credit Hours:		36

¹ BEC 601 must be taken twice.

² Students who took BEC 330 cannot take BEC 532. They will replace the course with a 2 hour Advised Elective.