## Biomanufacturing (Minor)

The Minor in Biomanufacturing is intended to provide new graduates with the knowledge base and hands-on skills that will prepare them to quickly contribute to a cGMP biomanufacturing operation in significant ways and should reduce the time needed for on-the-job training in those operations. Interested students should contact the representatives listed below.

# Administration of the Minor in Biomanufacturing

The BTEC staff will hold primary responsibility for administration of the Minor in Biomanufacturing Information about the Minor and application materials will be handled by an Administrative Assistant and the Assistant Director for Student Coordination will be the primary contact and academic advisor for the students who elect to enroll in the Minor.

### Contacts

For additional information about the Minor in Biomanufacturing contact:

#### Pa Nhia Moore

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SIS Code: 14BTECM

#### **Plan Requirements**

Requirements for the undergraduate Minor in Biomanufacturing include a **minimum of 15 credit hours** as specified below. All courses must be completed with a grade of "C-" or higher.

Prerequisite Courses to Enter the Minor: All students must complete both CH 101 Chemistry - A Molecular Science and BIO 183 Introductory Biology: Cellular and Molecular Biology.

Additional prerequisite courses in CH 221 Organic Chemistry I and CH 223 Organic Chemistry II will be required to complete the minor. Courses must be completed with a grade of C- or better.

Code	Title	Hours
Required Cour	rses	
Introductory S	Seminar:	1
BEC 220	Introduction to Drug Development and Careers Biomanufacturing	in
Basic Microbiology Laboratory Course:		
Select one of th	ne following:	
BEC 425	Molecular Biology for Biomanufacturing	
BIT 410	Manipulation of Recombinant DNA	
MB 352	General Microbiology Laboratory	
or MB 354	4 Inquiry-Guided Microbiology Lab	
Base Biomanufacturing Sequence:		
BEC/CHE 46	63 Fermentation of Recombinant Microorganisms	
BEC 330	Principles and Applications of Bioseparations	
Biomanufacturing Specialization:		

Select one sp	eciali	zation area:		
Upstream Operations:				
BEC 426 & BEC 480	l ) a	Upstream Biomanufacturing Laboratory and cGMP Fermentation Operations		
Downstream Operations:				
BEC 436 & BEC 485	1 5 a	ntroduction to Downstream Process Development and cGMP Downstream Operations		
Elective Cou	rses:		5	
Select 5 credi	ts of t	the following:		
Any 4** or	5** Le	evel BEC course		
BEC/BBS 4	426 l	Upstream Biomanufacturing Laboratory		
BEC 436	I	ntroduction to Downstream Process Development		
BEC 445	(	Cell Line Development for Biomanufacturing		
BEC/CHE	448 E	Bioreactor Design		
BEC/CHE	462 F	Fundamentals of Bio-Nanotechnology		
BEC 475	(	Global Regulatory Affairs for Medical Products		
BEC 480	C	cGMP Fermentation Operations		
BEC/BME	483			
BEC 485	C	cGMP Downstream Operations		
BEC/CHE	488 A	Animal Cell Culture Engineering		
BEC 495	9	Special Topics in Biomanufacturing		
BEC 497	E	Biomanufacturing Research Projects		
BEC 515	E	Biopharmaceutical Product Characterization Techniques		
BAE 425	I	ndustrial Microbiology and Bioprocessing		
BCH 351	(	General Biochemistry		
or BCH	451 F	Principles of Biochemistry		
BIT 410	ſ	Manipulation of Recombinant DNA		
BIT 466	1	Animal Cell Culture Techniques		
GN 311	F	Principles of Genetics		
MB 455	1	Microbial Biotechnology		
Total Hours		15	5-18	