Biomanufacturing (Certificate) (For Post-Baccalaureate Students)

To see more about what you will learn in this program, visit the Learning Outcomes website (https://apps.oirp.ncsu.edu/pgas/)!

The Certificate in Biomanufacturing provides 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.

Program Coordinator

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W (http://www.btec.ncsu.edu/)ebsite (http://www.btec.ncsu.edu/)

Admissions Requirements

Contact the Program Coordinator.

Plan of Study and Registration Information

Contact the Program Coordinator.

Academic Structure

Term Effective: 1/2009
Plan Code: 32BTECCTU
CIP Code: 26.1201
Description: Undergraduate Certificate in Biomanufacturing
Offered: On-campus format

Plan Requirements

Prerequisite: In order to enroll in the first course in the program, applicants must have earned a bachelor's level degree, and have completed CH 223 Organic Chemistry II (or equivalent) and BIO 183 Introductory Biology: Cellular and Molecular Biology. Interested graduates should contact the BTEC's manager of student programs.

Credits earned toward a bachelor's degree will not count for credit in the post-baccalaureate certificate.

Requirements for the Post-Baccalaureate Undergraduate Certificate in Biomanufacturing include a minimum of **13 credit** hours as specified below. All courses must be completed with a grade of 'C-' or higher:

Code	Title	Hours	Counts towards
Required Courses:		**6**	
BEC 425	Molecular Biology for Biomanufacturing		
or BEC 445	Cell Line Development for Biomanufacturing		
BEC 330	Principles and Applications of Bioseparations		
BEC/CHE 463	Fermentation of Recombinant Microorganisms		
Biomanufacturing Specialization:		**4**	
Select one specialization area:			
Upstream Operations:			
BEC 426 & BEC 480	Upstream Biomanufacturing Laboratory and cGMP Fermentation Operations		
Downstream Operations:			
BEC 436 & BEC 485	Introduction to Downstream Process Development and cGMP Downstream Operations		
Elective Courses:		**3**	
Select three credits of the following:			
Any 4** or 5** Level BEC Course			
BEC/BBS 426	Upstream Biomanufacturing Laboratory		
BEC 436	Introduction to Downstream Process Development		
BEC 445	Cell Line Development for Biomanufacturing		
BEC/CHE 448	Bioreactor Design		
BEC/CHE 462	Fundamentals of Bio-Nanotechnology		
BEC 475	Global Regulatory Affairs for Medical Products		
BEC 480	cGMP Fermentation Operations		
BEC/BME 483	Tissue Engineering Technologies		
BEC 485	cGMP Downstream Operations		

BEC/CHE 488	Animal Cell Culture Engineering	
BEC 495	Special Topics in Biomanufacturing	
BCH 351	General Biochemistry	
or BCH 451	Principles of Biochemistry	
BIT 410	Manipulation of Recombinant DNA	
BIT 466	Animal Cell Culture Techniques	
GN 311	Principles of Genetics	
MB 455	Microbial Biotechnology	
Total Hours		**13**