Biomanufacturing

The Golden LEAF Biomanufacturing Training and Education Center (BTEC) offers two graduate degrees: a thesis-based Master of Science (MS) in Biomanufacturing and a Master of Biomanufacturing (MR). Both are Professional Science Master’s (PSM) degrees, which provide advanced education and training in a specific discipline while simultaneously developing business skills highly valued by employers.

Both degrees offer students the choice of upstream (fermentation) or downstream (purification) concentrations to accompany courses in global regulatory affairs, protein characterization techniques, case studies in cGMP manufacturing of influenza vaccine, case studies in monoclonal antibody production, advanced biomanufacturing and biocatalysis, and an industry internship. Both degrees also include professional skills training in effective oral, electronic, and written communications for both technical and business careers. All MBA courses are taught by faculty from the Jenkins Graduate School of Management, a part of NC State’s Poole College of Management.

Admission Requirements
Admission to the BIOM program requires completion of an undergraduate degree in engineering, life science or physical sciences, letters of recommendation, and a statement of career goals. A minimum overall grade point average of 3.0 and GRE scores in the 80th percentile are also required. Applicants with previous industry experience or working professionals are strongly encouraged to apply.

Master’s Degree Requirements
Master of Biomanufacturing: BIOM students will complete a minimum of 36 total credit hours including a summer biomanufacturing industry internship, 3 credits of industry practicum case studies, 3 credits of global regulatory affairs and 9 credits of MBA courses in project management, biosciences management and business foundations.

Master of Science: The Master of Science degree requires a minimum of 36 credit hours. Similar to the MR, the BIOM Master of Science curriculum will combine interdisciplinary coursework with 6 MBA credits including a course in project management. In addition, the BIOM Master of Science program will provide more experience in bioprocess development research to familiarize students with the methods, ideals and goals of independent investigation, the concepts of quality by design (QbD), and methods used in industry for design of experiments (DoE) to define design space for industrial processes. As a consequence of the stronger focus on research, BIOM Master of Science students will complete 4 credit hours of industry-focused process research mentored by their BIOM graduate advisor. Each student will submit a written thesis, which will be presented to the student’s BIOM graduate advisory committee.

Student Financial Support
A limited number of full-time participants in the Master of Biomanufacturing program may be eligible for teaching assistantships or industry-sponsored graduate scholarships.

Other Relevant Information
BIOM accepts students in spring and fall semesters. A 10 credit hour graduate minor is also available for NCSU students currently enrolled in thesis-based graduate programs. Two unique 12 credit

Graduate Certificates: Upstream Biomanufacturing and Downstream Biomanufacturing are also offered for students currently enrolled in other non-thesis graduate programs.

Degrees
- Biomanufacturing (MR) (http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-mr/)
- Biomanufacturing (MS) (http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-ms/)
- Biomanufacturing (Minor) (http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-minor/)
- Downstream Biomanufacturing (Certificate) (http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/downstream-biomanufacturing-certificate/)
- Upstream Biomanufacturing (Certificate) (http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/upstream-biomanufacturing-certificate/)

Faculty

Full Professors
Ruben G. Carbonell
Amy Michele Grunden
Harold Henry Lamb
Paul Edward Mozdziak
Balaji M. Rao
Heike Inge Ada Sederoff
John Douglas Sheppard

Associate Professors
Paul T. Hamilton
Gavin John Williams

Assistant Professors
Stefano Menegatti

Practice/Research/Teaching Professors
Kirill Efimenko
Gary Louis Gilleskie
Imara Yasmin Perera
John H. van Zanten
Emeritus Faculty
Michael Carl Flickinger