

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.

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.

Biomanufacturing Program Website (<http://www.btec.ncsu.edu/academic/graduate/>)

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. Applicants with previous industry experience or working professionals are strongly encouraged to apply.

Applicant Information

Biomanufacturing (MR and MS)

- **Delivery Method:** On-campus
- **Entrance Exam:** None
- **Interview Required:** None

Application Deadlines

- **Fall:** March 31
- **Spring:** November 15

Degrees

- Biomanufacturing (MR) (<http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-mr/>)
- Biomanufacturing (MR): Industry Track (<http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-mr/industry-track/>)
- Biomanufacturing (MS) (<http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-ms/>)
- Biomanufacturing (Minor) (<http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-minor/>)
- Biomanufacturing Online Graduate Certificate (<http://catalog.ncsu.edu/graduate/engineering/biomanufacturing/biomanufacturing-online-graduate-certificate/>)
- 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 Mozdziaik

Balaji M. Rao

Heike Inge Ada Sederoff

John Douglas Sheppard

Associate Professors

Paul T. Hamilton

Gavin John Williams

Assistant Professor

Stefano Menegatti

Practice/Research/Teaching Professors

Kirill Efimenko

Gary Louis Gilleskie

Imara Yasmin Perera

John H. van Zanten

Emeritus Faculty

Michael Carl Flickinger

Instructors

Gregory Kale Buhrman

Hayley Flores

Sara Siegel