What is NBC2?
Northeast Biomanufacturing Center and Collaborative

NBC2 is a National Science Foundation Advanced Technology Education Center of Excellence

Our Mission: to coordinate local and regional efforts into a national biomanufacturing education and training system to promote, create, and sustain a qualified workforce.

Biomanufacturing.org
Goals for 2016-2019:

1. **Build and foster local partnerships** between industry, educational institutions and government

2. **Provide professional development opportunities** for CC and HS faculty and students – PiC, BIOMAN, Bootcamp

3. **Develop curricular materials**: textbook, lab manuals, SOPs

4. **Disseminate information on biomanufacturing**: career opportunities and curricular materials via workshops and website *biomanufacturing.org*

5. **Plan for sustainability of NBC2 and programs**
NBC2 Team

- Maggie Bryans, PI, MCCC
- Linda Rehfuss, Co-PI and co-Lead, Bucks
- Matt Marshall, Program Manager at MCCC
- Cianna Cooper, Program Manager at Bucks

Co-PIs at 4 NBC2 Hub Schools:
- Jim Hewlett, Finger Lakes CC
- Sengyong Lee, Ivy Tech CC
- Mike Fino, Miracosta CC
- Bill Woodruff, Alamance CC
National Regional Hubs

- **BigPharma Hub**
  Montgomery County Community College, Blue Bell, PA
  Dr. Maggie Bryans
  Bucks County Community College, Newtown PA
  Dr. Linda Rehfuss

- **Upstate New York Hub**
  Finger Lakes Community College, Canandaigua, NY
  Dr. Jim Hewlett

- **Mid-Western Hub**
  Ivy Tech Community College, Bloomington, IN
  Dr. Sengyong Lee

- **Western Hub**
  MiraCosta College, Oceanside, CA
  Dr. Mike Fino

- **Southern Hub**
  Alamance CC, Graham, NC
  Dr. Bill Woodruff
* Introduction to Biomanufacturing (textbook), December 2012
* Biomanufacturing Laboratory Manual, July 2009
* *Escherichia coli* – GFP Core Production System
* CHO – tPA Core Production System
* *Pichia pastoris* – HSA Core Production System

**Protein is Cash Laboratory Manual, 2017**

* Standard Operating Procedures & Batch Records for all laboratory exercises

  Biomanufacturing Laboratory Manual (custom)

  Great Bay Community, Mount Wachusetts Community College and MCCC

* Free to download at [biomanufacturing.org](http://biomanufacturing.org)
Find Biomanufacturing Education and Career Opportunities in your State / Region

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Find Biomanufacturing Education and Career Opportunities in your State / Region

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Regional Resources

Biomanufacturing Industry
BioFlorida
UF Center of Excellence for Regenerative Health Biotechnology
North Carolina Biosciences Organization
North Carolina Biotech Center

Biomanufacturing Education
BioNetwork
Alamance Community College
Biomanufacturing.org/careers

Find Biomanufacturing Education and Career Opportunities in your State / Region

BioAgilytix

LARGE MOLECULE BIOANALYSIS DONE DIFFERENTLY

TO HELP YOU ACHIEVE MORE.

BioAgilytix has evolved the model for partnership in large molecule bioanalysis to benefit our customers and the patients they serve.
Biomanufacturing produces a wide range of biobased products in the emerging global bioeconomy. Modifying living organisms to manufacture useful products includes genetic engineering as well as advanced cell and tissue culture technologies. Biomanufacturing requires knowledge and methods from many scientific spheres including chemical and bioprocess engineering. Resulting products range from biopharmaceuticals to medical devices to energy fuels, chemicals, materials, and consumer goods. The application of biotechnology to industrial processes is not only transforming how we manufacture products it’s also producing new products – such as pollution-eating microbes – we couldn’t have imagined in years past.

Every job in a biomanufacturing enterprise must combine into a unified effort that builds quality into each stage of making the product. Everyone involved shares the goal of achieving the highest quality product on a consistent basis. Commonly held skill standards and protocols establish and maintain this state of thorough control. For the employee, this requires a degree of tenacity to meet demands of meeting the high standards of the company.
NBC2

Faces of Success
Katrice Jalbert
Job Title: Deviation Writer Level II
Company: Lonza Biopharmaceuticals

Education Pathway:
• H.S. Degree in Biotechnology
• Associates Degree in Biotechnology & Biomanufacturing at Great Bay Community College, Portsmouth, NH
• Apprenticeship with Lonza Biopharmaceuticals led to her hiring
Liz Neuman
Job Title: Research Assistant
Company: Qualtek Molecular Laboratories

Education Pathway:
• Associates Degree in Biotechnology & Biomanufacturing at MCCC in Blue Bell, PA
• Bachelor’s Degree in Microbiology and Biotechnology at Delaware Valley College
Karin Klauder
Job Title: Quality Control Chemist
Company: GEO Specialty Chemicals

Education Pathway:
• Associates Degree in Biotechnology & Biomanufacturing at MCCC in Blue Bell, PA
Kristine Lewis
Job Title: Quality Control Analytical Chemistry Stability Assistant
Company: Cook Pharmica LLC

Education Pathway:
• Associates in Biotechnology from Ivy Tech Community College Bloomington
• Bachelor’s in Biotechnology from Indiana University
• Master’s in Biotechnology and Regulatory Affairs online program at John Hopkins University,
Kevin Brown
Job Title: Research Associate
Company: Biotechnic Products LTD

Education Pathway:
• Biotechnology Academy High School Program
• Biomanufacturing certificate at MWCC
• Internship at Biotechnic Products LTD
David Haddadd
Job Title: Lab Assistant
Company: Millennium (Takeda)

Education Pathway:
- High School Biotechnology
- Associates in Biotechnology and Biomanufacturing at NHCTC
- Apprenticeship at Millennium
- Bachelor’s Degree at Harvard
- Master’s Degree in Biotechnology at Harvard
Rick Wollover
Job Title: QC Associate
Company: KVK-Tech

Education Pathway:
• Associates in Biotechnology at Bucks County Community College
Protein is Ca$h HS Teacher Workshop
Protein is Cash HS teacher workshop

Central Dogma: DNA → RNA → Protein

- Discovery Research (DNA Centric)
- Process Development and Biomanufacturing (Protein Centric)

DNA is the FLASH, Protein is the CA$H!!!!
Protein is Ca$h HS teacher workshop

Agenda:

DAY 1: Metrology – pipette performance verification
DAY 2: Upstream Processing – bacterial transformation/scale up
DAY 3: Downstream Processing – column chromatography
DAY 4: Quality Control Biochemistry – SDS PAGE
DAY 5: Biofuels – crossover industry

Goals: to increase knowledge of -

• the Biopharmaceutical Industry
• types of jobs and career pathways available
• how to introduce the main concepts of the industry into your high school lab.
Protein is Cash teacher support website:

Navigate to: Biomanufacturing.org
  NBC2 Workshops
  Protein is Cash Workshops
  Protein is Cash Resources

Protein is Cash laboratory manual with Standard Operating Procedures (SOPs) for each experiment.