



Tamara Mandell M.Ed.
Director, UF Biotility
tmandell@cerhb.ufl.edu

National Career Pathways
Network Conference
October 15-16, 2020

Credentialing and Careers in the Bioscience Industry



University of Florida

Center of Excellence for Regenerative Health Biotechnology

Est. 2003 (Florida Biologix & Biotility)

Mission:

- Economic development for State of Florida
- Improve climate and expand infrastructure for translational research
- Develop courses for workforce training



 **Florida Biologix™**

 **Biotility™**
APPLIED BIOTECH TRAINING

Building the Workforce



Florida Partnership for Industrial Biotechnology

- Develop & deliver curricula for industrial biotechnology (short-course) training
- Ensure programs within educational institutions are relevant & meet industry's needs & standards
- HS Industrial Biotechnology Program
 - Blended CTE/Academic Credit
 - “Equally Rigorous” Science
- Articulation Agreements
- Teacher Professional Development



High School Industrial Biotechnology I, II, III

- Comprehensive sequence covering skills used by industrial, medical, agricultural and research facilities
 - Biotech I & II -Students earn 0.5 each of **Academic** (elective science) and **CTE credit**
 - Biotech III earns 1 full **CTE credit**
 - Performance and Sunshine State Standards (Next Generation) assigned to each benchmark
- **Provides *multiple* career paths**
 - Articulation into A.S. degree/Certificate
 - University
 - Entry level employment



Secondary Industrial Biotechnology

Biotech I

3027010

History, Benefits, Careers
Safety Procedures
Solution Preparation
Basic Chemistry
Basic Equipment
Cell Structure & Function
Culturing Microorganisms
Sterile Technique
Experimental Design
DNA Isolation/Analysis
Environmental Monitoring
Data Analysis
Law & Ethics
Documentation
Communication

Biotech II

#3027020

Transformation
Culture Scale-up
Recombinant Proteins
Production of Proteins
Protein Quantification
Filtration & Purification
ELISA
PAGE
Immunoblotting
PCR
Assay Development
Quality Control
Quality Assurance
Regulatory Affairs
Product Marketing

Biotech III

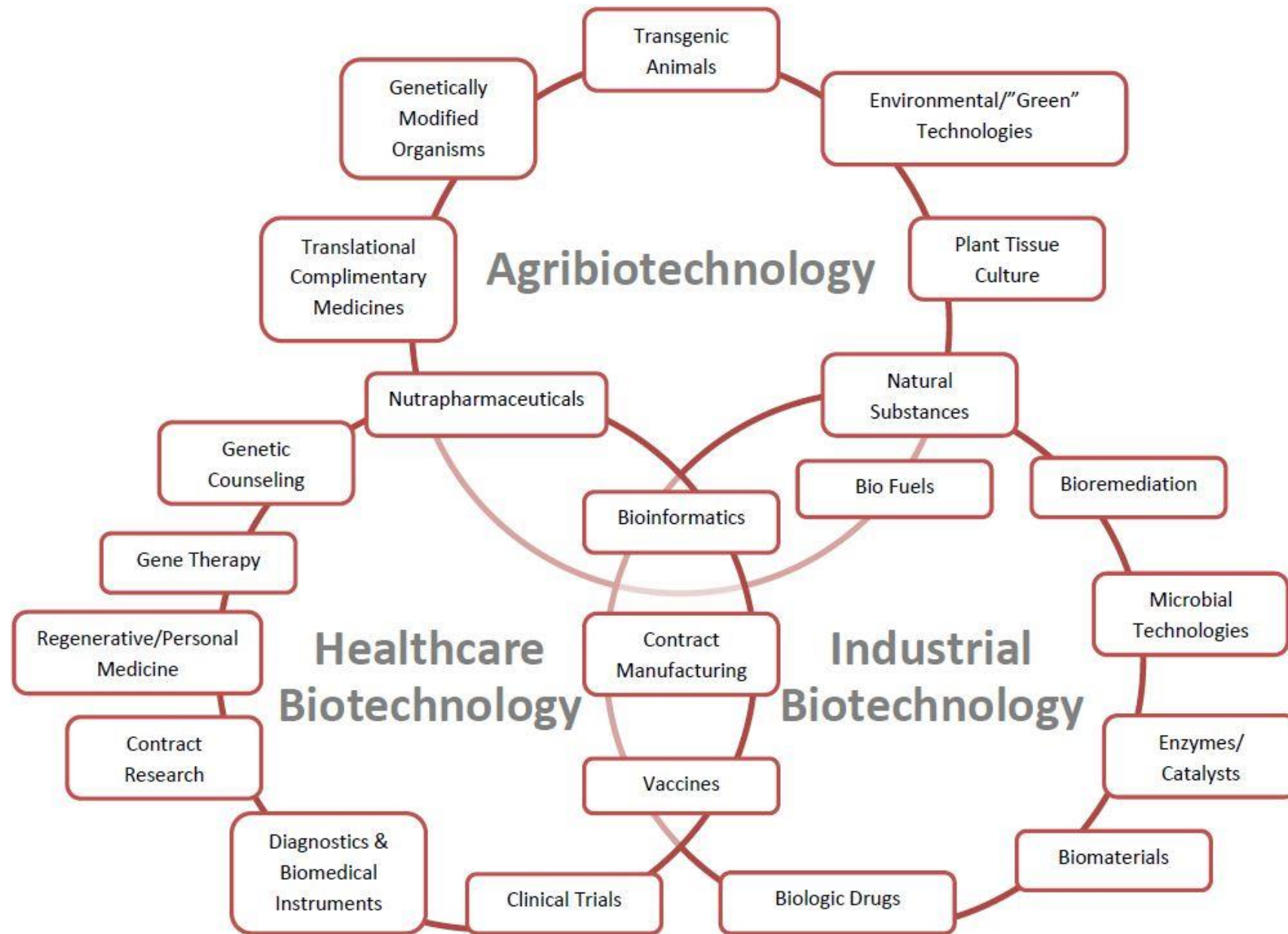
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CTE Credit Only
Independent design
and implementation of
student projects,
simulating employment
in a biotechnology-
based industry and
utilizing industry
partners



Comprehensive sequence covering skills used by industrial, medical, agricultural and research facilities





Industry Career Opportunities

- Research & Development
- Manufacturing
- Quality Control (QC)
- Quality Assurance (QA)



Technician Level

- Process Technician
- Quality Control Tech
- Quality Assurance Tech
- Manufacturing Tech
- Research Tech

Plus Education/Experience

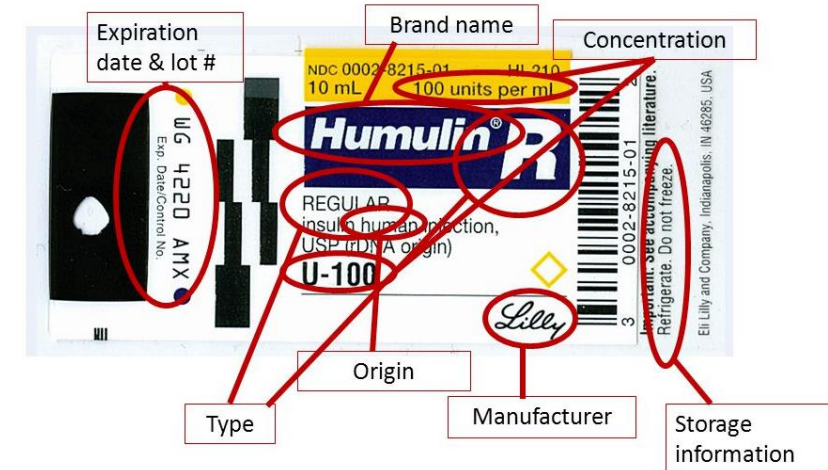
- Process Development
- Quality Control Asst./Assoc.
- Quality Assurance Asst./Assoc.
- Validation Specialist
- Research Asst./Assoc./Scientist



Research & Development (R&D)

- Find/develop a potential product with commercial value
 - Develop processes to make the product
- Characterize the properties of the product
 - Composition, physical & chemical properties
 - Effect, strength, potency
 - Purity
 - Stability & shelf life
 - Product applications
 - Safety concerns (use and production)
- Establish product specifications
- Develop methods to test the product

Insulin – LABELS



<https://slideplayer.com/slide/4583246/>

Manufacturing/Production Unit

- Operate (large-scale) equipment
 - Bioreactors, Purification Systems, Filtration Systems, Fill-Finish
- Preparation of supporting materials
- Routine production environment control
- Monitor process parameters
 - Implement corrective actions
- Facility Maintenance
 - Maintenance & repair of equipment & facility
 - Calibration
- Receiving and Shipping
 - Insure proper routing of incoming raw materials
 - Shipment of finished products



Quality Control

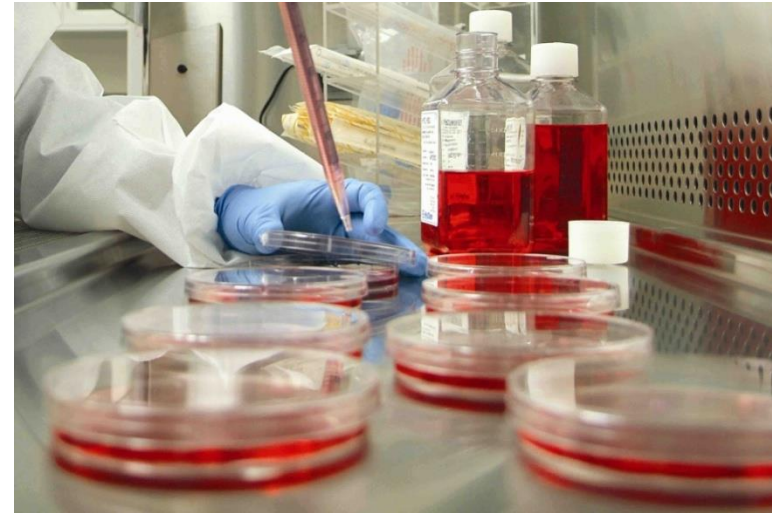
Demonstrate Product Safety
through the testing of:

- Raw materials
- Components
- In-Process samples/materials
- Finished product

Demonstrate product lot
consistency

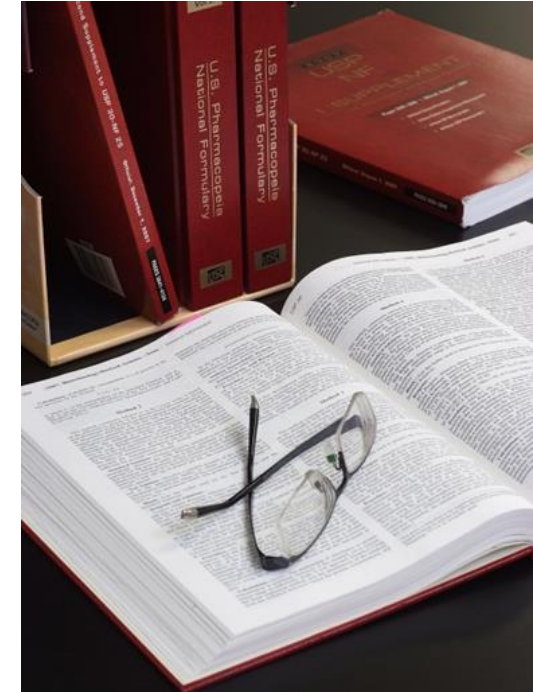
Demonstrate product stability

Environmental Monitoring



Quality Assurance

- Ensure compliance with cGMPs, cGLPs, cGCPs
 - Independent
 - Control, prepare and issue documents
 - Training oversight
 - Inspections/Audits
 - Review customer complaints
 - Review and Approve all Records, Reports, written specifications
 - Ultimate authority to release/reject raw materials and product lots



Rigorous Programs of Study (2008)

- US Office of Career, Technical, and Adult Education (OCTAE)
 - FL DOE to UF-CERHB: Florida's Biotechnology Articulation consortium (FBAC)
 - Develop and promote a rigorous program of study
 - Implement a statewide articulation agreement (secondary to associate degree) in the area of Biotechnology

Florida's Career and Professional Education Act: §1003.491

Purpose: to provide a statewide planning partnership between the business and education communities in order to attract, expand and retain targeted, high-value industry and to sustain a strong, knowledge-based economy.

- Improve academic performance through rigorous & relevant curricula
- Provide rigorous and relevant career-themed courses
- Opportunities to articulate to *postsecondary coursework* and *earn industry certifications*



Based on foundational concepts and skills required in biotechnology-based workplace settings

- Written & Practical exam
 - Aligned w/Academic and Performance Standards
- Industry recognition via BioFlorida
 - Relevance, Accuracy, Alignment to Standards



- Approved by Florida's Board of Education, Jan., 2012 for statewide articulation (A.S.) Biotechnology
- Approved by Florida's Agency for Workforce Innovation



Knowledge Exam Subjects

BIOLOGICAL SYSTEMS

- Cells (general)
- Cell Structures and Function
- Genetics/Model Organisms
- Central Dogma of Molecular Biology
- Immune System

CHEMISTRY/BIOCHEMISTRY

- Bonds
- Cell Respiration
- Chemistry, Molecules & Macromolecules
- DNA Structure & Function
- Enzymes & Reactions
- Periodic Table
- Protein Structure & Function
- Reaction Rates
- Translation (Gene Expression)

RESEARCH & SCIENTIFIC METHOD

- Experimental Design
- Scientific Method
- Analyze/Interpret Data
- Maintain Lab Book
- Communicating Scientific Research

LABORATORY SKILLS/APPLICATIONS

- Culturing Microorganisms
- Aseptic Technique
- DNA Isolation, Purification, Quantitation
- Restriction Enzymes/Digests/Cloning
- Transformation & Transfection
- Protein Expression, Purification and Quantitation
- Agarose & PAGE Electrophoresis
- Polymerase Chain Reaction (PCR)
- Spectrometry, pH, Microscopy
- Immunoassays
- Equipment Maintenance, Calibration, Validation
- Scientific Notation, Significant Figures, Decimals

GENERAL TOPICS IN BIOTECHNOLOGY

- Historical and Current
- Applications, Benefit to Society, Ethics
- Biotech Careers
- Regulatory Compliance
- Workplace/Safety



BACE Practical Exam Subjects

APPLIED MATHEMATICS

- Scientific Notation, Significant Figures, Decimals, Correct Units
- Graphing, Axis Scaling & Limits
- Standard Curves, Beer's Law
- Interpreting Data
- Volume/Volume Calculations
- Weight /Volume Calculations
- Molarity Calculations
- Serial Dilutions, & from Concentrate

BIOTECHNOLOGY SKILLS

- Culturing Microorganisms
- Aseptic/Sterile Technique
- Electrophoresis
- Accurate Weight and Volume Measurement
 - Pipetting (Macro and Micro)
- Measuring/Adjusting pH
- Preparing Solutions, Buffers, Media
- Spectrophotometry, Centrifugation

LABORATORY EQUIPMENT

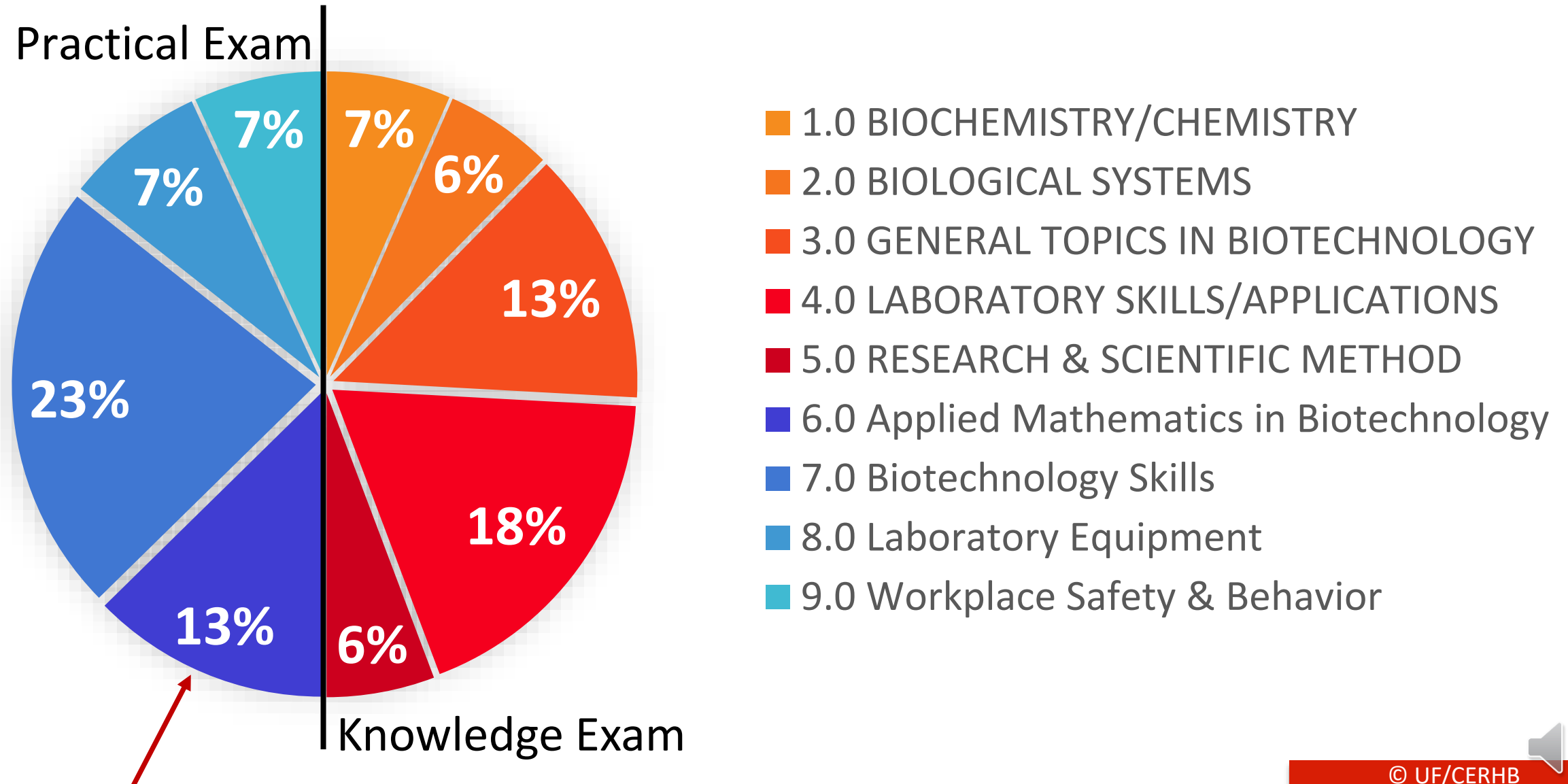
- Electrophoresis Equipment
- Spectrophotometer
- pH Meter
- Micro/Macropipettors
- Balances
- Fume Hoods and Biosafety Cabinets
- Microscope
- Stirrers, Shakers, Vortex
- Water Bath, Incubator, Autoclave
- Glassware

WORKPLACE SAFETY & BEHAVIOR

- Identify Safety Symbols
- Laboratory Safety Protocols/Handling Waste
- Using Safety Data Sheets (SDS)
- Personal Protective Equipment (PPE)
- Proper Labeling
- Regulatory Compliance, Documentation
- Identify Acceptable Work Habits



2020 BACE Category Distribution: Percentage of Points Per Category

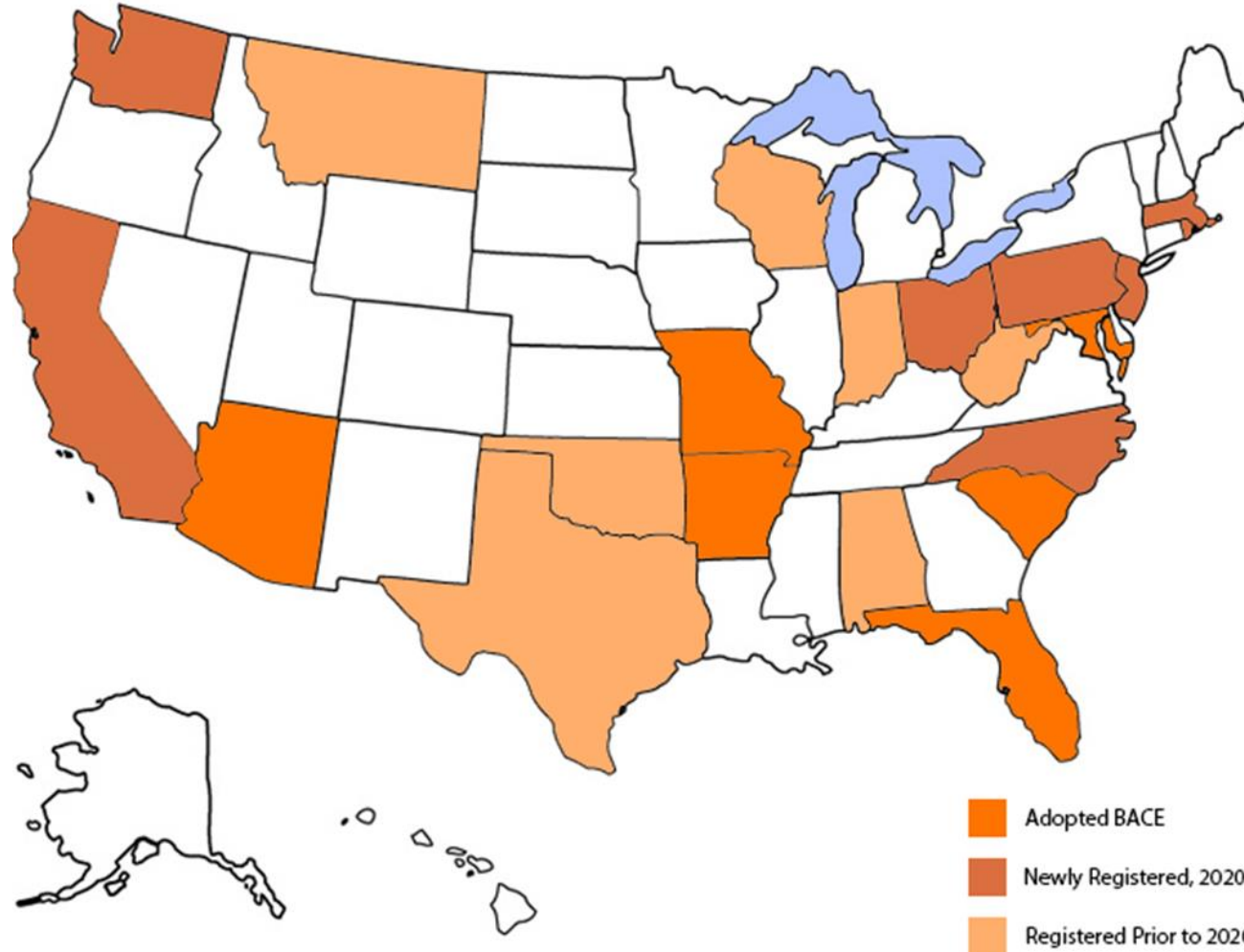


Expanding the Opportunity

Traditional Biotech

Alabama
Arizona
Arkansas
Florida
Indiana
Maryland
Missouri
Montana
Oklahoma
South Carolina
Texas
West Virginia
Wisconsin

Brazil



PLTW

Alabama
Arkansas
Florida
Indiana
Maryland
Missouri
Montana
Oklahoma
South Carolina
Texas
West Virginia

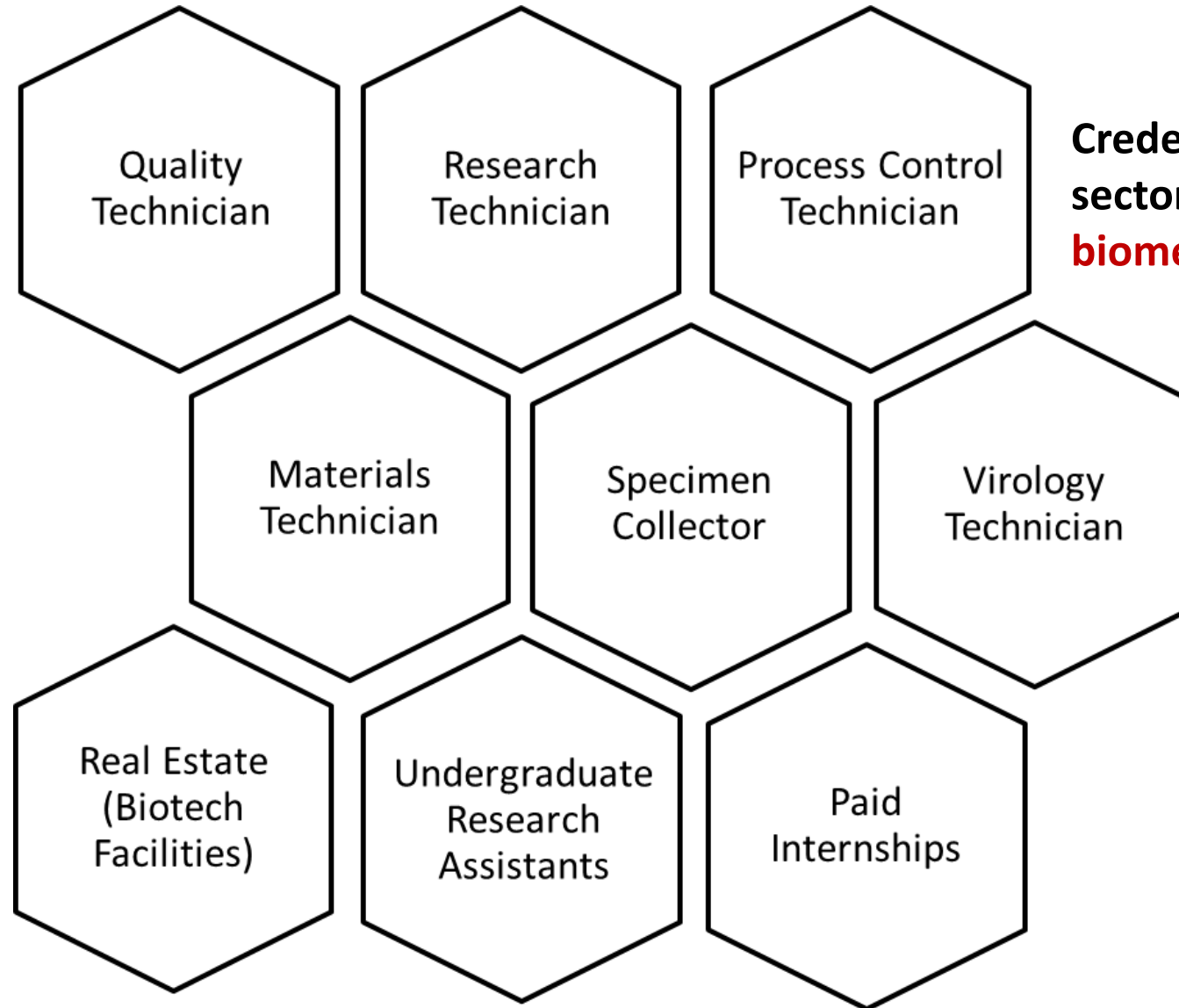


Credential Earner Employers

- ANDRITZ
- Applied Genetic Technologies, Corp.
- Avidyne
- Bayer
- Bureau of Public Health
- Cutrale, Inc.
- Foundry Commercial
- GE Aviation
- Massachusetts General Hospital
- Mayo Clinic
- Mérieux NutriSciences
- MIT Lincoln Laboratory
- MIT Teaching Systems Lab
- Monsanto
- Nobel Research Institute
- Nothrop Grumman
- Novabone, Inc.
- NYU Langone Health
- Ology, Inc.
- OPharmatech, Inc
- RTI-Surgical, Inc.
- Southern Earth Sciences
- Syngenta, Inc.
- Tallahassee Memorial Healthcare
- The Selling Factory
- Thermo-Fisher Scientific
- UF College of Dentistry
- UF College of Medicine
- Ultimate Nutrition, Inc.
- United Juice Companies of America
- University of Utah Health
- USDA
- IFAS, MIT, Koch Institute, Paid internships



Positions



Credential earners work in a variety of industry sectors! These include agriculture, food science, biomedical, medical device, and many more.



National Advisory Board

COMPANY	TITLE	STATE
ACell, Inc.	Senior Product Manager	Maryland
AGTC	Scientist, Preclinical & Clinical Assays, R&D	Florida
Akron Biotech	Manager, Strategic Alliances	Florida
AxoGen, Inc.	Product Development Engineer	Florida
Boehringer Ingelheim Animal Health	Principal Scientist	Iowa
ELISA Technologies	Scientific Director	Florida
Encoded Therapeutics, Inc.	Director, Process Development & Manufacturing	California
Georgia Bio	VP, Operations	Georgia
K2M, Inc.	Director, Clinical Affairs	Virginia
Merck & Co.	Associate Director, Engineering	Pennsylvania
PCM Trials	Director, Clinical Operations	Colorado
QuickStart	Director, Georgia BioScience Training Center	Georgia
StrideBio, Inc.	VP, Preclinical Development	North Carolina
Yukon Medical, LLC	Senior Director, Product Development	North Carolina

New edition!

Biotechnology: A Laboratory Skills Course, Second Edition

By J. Kirk Brown



AVAILABLE LATE
SUMMER 2018



Take a peek inside

Meet the author



Get credentialing
for your students

Put the power and excitement of Biotechnology at your students' fingertips

Biotechnology: A Laboratory Skills Course is a ready-to-go solution for your biotechnology course, or to start a new one right away! This laboratory textbook provides you and your students with background information about the methods and techniques used in today's exciting research and manufacturing laboratory environments.



BACE Registration

<http://biotility.research.ufl.edu/bace>

Biotility
APPLIED BIOTECH TRAINING

INDUSTRY **BACE** STUDENTS TEACHERS LAB EXPERIENCES ABOUT US CONTACT

BACE

Biotechnician Assistant Credentialing Exam

The Biotechnician Assistant Credentialing Exam (BACE) is an industry-recognized exam designed to assess core skills and knowledge sets identified by industry, and represented within the academic and performance standards of Biotechnology programs. The exam was originally vetted by the state of Florida's industry organization, BioFlorida, which represents more than 3,000 companies and research organizations in the biotechnology, pharmaceuticals, medical devices, and bioagriculture sectors. Since its creation, BACE has been assessed by national and international companies as other states adopt the exam.

BACE FAQs
VIEW FAQs >

ADMINISTRATOR RESOURCES
VIEW RESOURCES >

CANDIDATE RESOURCES
VIEW RESOURCES >

UF E-LEARNING
LOGIN >

Scroll to learn
more about BACE
and Begin the
Registration
Process



Remote Testing - Honorlock

- Remote testing for the BACE became available April 20th, 2020 and is board-approved to July 15th, 2021.
- During this window, candidates are permitted to take both the Knowledge and Practical portions of the BACE from their home or any other location of their choice. These changes have been approved by the National Advisory Board.
- Below are links to two documents, one for you and one for students, which contain the detailed information needed to take the BACE.
- [BACE Remote Testing Procedures](#)
- [Candidate Information Bulletin](#)

Candidate Enrollment Process

- Unique candidate enrollment links emailed to Site Coordinators

During first login, candidates create an account by:

- Registering through an existing external identity (Gmail, [LinkedIn](#), or Facebook)
 - Provide Name, Birthdate, email address, phone number
 - Verify email address
- Free Practice Exam
- BACE Knowledge Exam



Fee Structure & Testing Window

- The BACE is now available year round (excluding holidays). All Exams and Exam Retakes must be completed by the end of each calendar year.
- 1st Attempt (includes Knowledge and Practical Exams) **\$150.00**
- Knowledge Exam 2nd Attempt **\$25.00**
- Practical Exam 2nd Attempt **\$25.00**
- Knowledge Exam 3rd Attempt **\$25.00**
- Practical Exam 3rd Attempt **\$25.00**

Includes materials for Practical Exam

BACE Results: Program Growth and Passing Rate

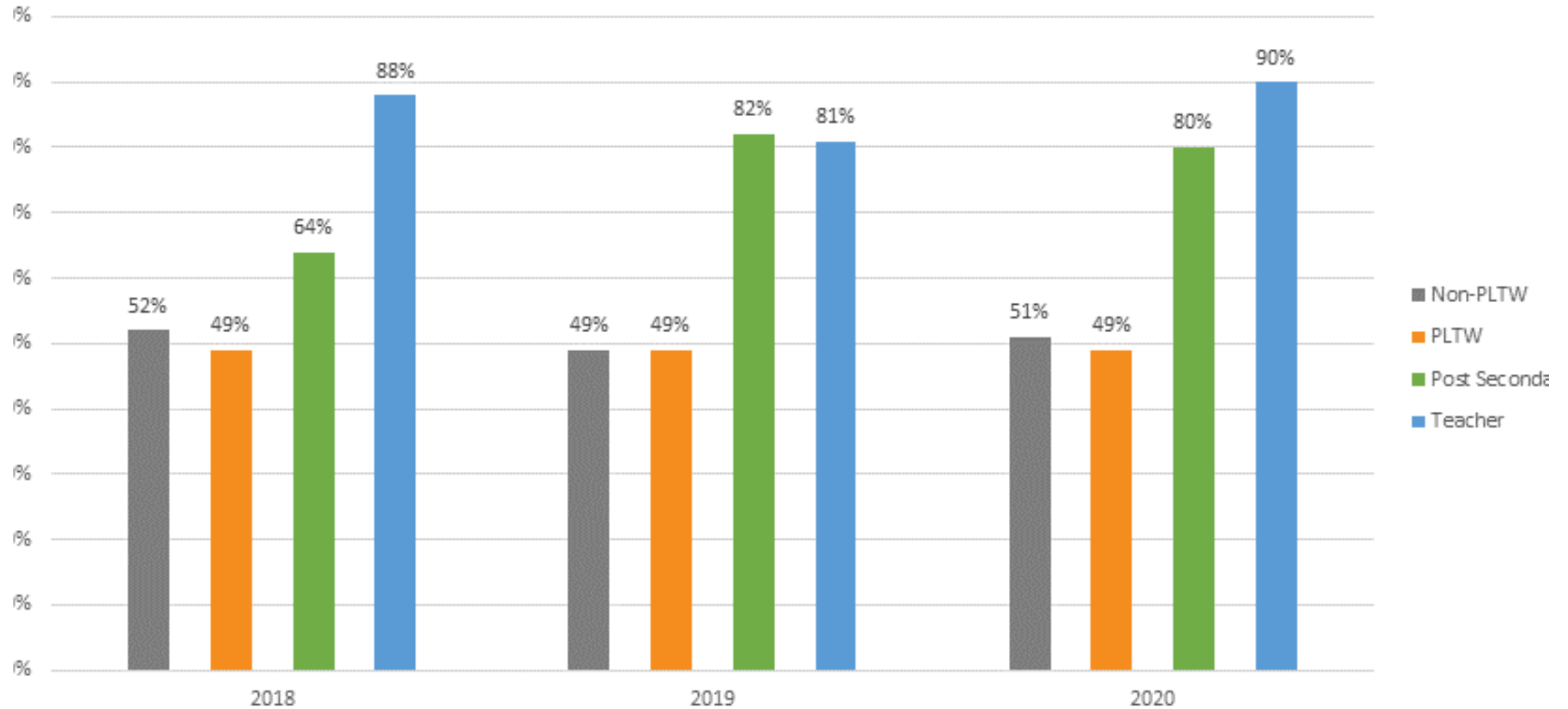
Year	Participating Sites	Candidates	Passing Candidates	Passing Rate
2012	5	55	38	69%
2013	7	100	63	63%
2014	17	338	182	54%
2015	26	417	286	69%
2016	32	592	373	63%
2017	50	1063	638	60%
2018	60	1236	639	52%
2019	80	1461	728	50%

***2020 outcomes are in the process of being finalized. Pass Rate to date is 51%**



BACE Pass Percentage Results

Program Passing Rate by Year



Instructor Professional Development

Industrial Biotechnology Teacher Experience (IBTE)

- Provides experience with the skills, techniques, and knowledge within context of working in the industry.
- Design, development, testing, and manufacture of a biopharmaceutical product.
- Participants develop an understanding of the departmental roles, careers, and criteria associated with working in this highly regulated environment.

Know Your ABCS: Applications of Biotechnology for the Classroom

- Presents multiple interactive modules for use in the classroom
- Dengue outbreak in Key West, Florida (2009). Participants perform clinical tests and take on role of diagnostic laboratories.
- Overview of bacteriology and proteomics, covering:
 - Aseptic technique
 - structure and function of proteins, using SDS-PAGE and mass spectrometry.
- Practice working in a regulated environment.



Contact Information

Tamara Mandell, M. Ed. (Director)
tmandell@cerhb.ufl.edu
(386) 462-6397

Lisa Mrozinske (Credentialing Specialist)
lmrozinske@cerhb.ufl.edu

Houda Pruitt, Ph.D. (Senior Training Specialist)
hpruitt@cerhb.ufl.edu

Stephanie DeMarco, M.Ed. (Educational Support Specialist)
demarcos@cerhb.ufl.edu

Biotility website **<http://biotility.research.ufl.edu>**

THANK YOU!!!